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ABSTRACT

This document contains a curriculum guide and lesson plans for a general mechanical repair course with three sections: minor automotive maintenance, small engine repair, and welding. The curriculum guide begins with a matrix that relates the lesson plans to essential elements of math, science, language arts, and social studies and to Texas Assessment of Academic Skills objectives. Next are listed the common essential elements of trade and industrial education, followed by an instructional delivery outline for the three sections, listing the topics of instruction, essential elements, materials, and number of hours. Unit and specific objectives are given. An appendix provides modification techniques for special populations and 26 references. The lesson plans for minor automotive repair, small engine repair, and welding contain the following elements for each topic: essential element(s); type of lesson; unit objective; specific objectives; tools and equipment; materials; teaching aids; references; introduction/motivation/warm-up; teacher activities; student activities; evaluation/verification; and summary/closure. Appendix A provides answers to assignment sheets, and appendix B gives answers to the competency test. (NLA)

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Curriculum Guide

General Mechanical Repair

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Minor Automotive Maintenance
Small Engine
Welding

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GENERAL MECHANICAL REPAIR

CURRICULUM GUIDE

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To ensure educational equity, this material has been reviewed to eliminate bias or stereotyping.

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PREFACE

The Educational Development and Training Center at East Texas State University is striving to provide needed materials to vocational instructors within the state.

The purpose of this publication is to assist instructors in improving instruction. As these materials are used, it is hoped that student performance will improve and students will be better prepared to assume a role in the field of General Mechanical Repair.

Instructional materials in this publication are written in terms of student performance, using measurable objectives. This approach augments the teaching-learning process. Criterion-referenced evaluation instructions are provided for uniform measurement of student progress. In addition to evaluating recall information, teachers are encouraged to evaluate the other areas, including progress and the finished product.

The instructor should, where appropriate, reinforce the application of basic academic skills. For example, when addressing the area of study, the instructor should stress to students that they will be applying specific mathematical skills such as addition, subtraction, multiplication, and division that they have learned in previous academic courses. Effective teaching practices research, and consequently the Texas Teacher's Appraisal System, emphasizes the relationship of new learning to prior or future learning. In some cases, specific academic skills needed to complete job tasks may not have yet been addressed in the academic courses in which the students have been enrolled. If this is the case, the vocational instructor should introduce and explain the academic skills, and collaboratively work with the appropriate academic teachers. Students should then achieve a level of mastery that will allow them to perform the job tasks. Instructors of vocational courses are encouraged to work closely with instructors of academic courses to ensure that students are taught fundamental academic principles correctly.

Every effort has been made to make this publication basic, readable, and by all means, usable. Three vital areas of instruction (motivation, personalization, and localization) are not included in this publication; however, they should be capitalized on by the instructor. Only then will this publication really become a vital part of the teaching-learning process.

General Mechanical Repair Matrix

Because it is imperative our future work force be able to compete in an increasingly global economy, students enrolled in vocational education courses must acquire academic knowledge and skills as well as the occupationally specific knowledge and skills.

In preparing the General Mechanical Repair Matrix, EDTC staff analyzed the lesson plans to determine where academic principles were applied. The matrix was then designed to correlate specific lesson plans to the essential elements of mathematics, science, language arts, and social studies and the objectives of the Texas Assessment of Academic Skills (TAAS). It is hoped this matrix will assist educators in integrating vocational and academic education so that relevancy for learning can be established.

Academic Courses' Essential Elements

English Language Arts: **75. 61**

1.	(b)(4)(A)	Expand vocabulary
2.	(c)(4)(F)	Follow complex directions
3.	(d)(1)(A)	Use the composing process to plan and generate writing
4.	(d)(4)(G)	Use various reference materials
5.	(e)(2)(D)	Use oral language in a variety of situations

Mathematics: **75.63**

1.	(a)(1)(A)	Identify and use appropriate units of measure
2.	(a)(1)(B)	Solve problems involving measures
3.	(a)(1)(C)	Apply ratio and proportion
4.	(a)(3)(A)	Use the operations of addition, subtraction, multiplication, and division of whole numbers and integers in problem-solving situations
5.	(a)(3)(B)	Use fractions and their relative value
6.	(a)(3)(C)	Use the operations of addition, subtraction, multiplication, and division of fractions and decimals in problem-solving situations
7.	(a)(4)(A)	Compute income and wages
8.	(a)(4)(B)	Interpret deductions on paycheck stub
9.	(a)(4)(D)	Make budget
10.	(a)(4)(E)	Open and maintaining checking and savings account
11.	(a)(5)(C)	Measure
12.	(a)(5)(F)	Use graphs
13.	(a)(5)(G)	Use probability and statistics
14.	(a)(5)(H)	Work with personal finance
15.	(a)(6)(A)	Use counting methods and factorials
16.	(a)(6)(E)	Make predictions
17.	(b)(1)(A)	Interpret charts, tables, graphs and maps
18.	(b)(1)(C)	Determine wages and deductions from given information
19.	(b)(2)(A)	Find cost of: i. housing ii. food iii. transportation iv. clothing v. insurance

20. (b)(2)(B)	Make decisions by comparing different types of the cost
21. (b)(2)(C)	Find discounts, sales, rebates, coupons, etc.
22. (b)(4)(A)	Investigate the use of credit cards and charge accounts
23. (b)(4)(B)	Study options for loans
24. (b)(5)(A)	Use banking forms
25. (b)(5)(B)	Compare advantages and disadvantages of investments
26. (b)(7)(A)	Calculate wages and deductions
27. (b)(7)(B)	Develop a personal budget
28. (c)(3)(B)	Use ratio and proportion
29. (c)(3)(C)	Find percent and percentage
30. (c)(3)(D)	Determine needs related to personal finance
31. (c)(4)(C)	Use metric and customary units
32. (c)(4)(D)	Find distance, perimeter, circumference, area, surface area and volume
33. (d)(1)(A)	Develop the concept of measuring using measuring instruments
34. (d)(1)(B)	Estimate measures
35. (d)(4)(B)	Demonstrate a knowledge of similarity and similar figures
36. (d)(4)(D)	Apply similarity to maps and scale drawings
37. (d)(6)(C)	Find distance between points
38. (d)(9)(B)	Compute circumference and area of circles
39. (d)(10)(D)	Apply the formulas to practical problems related to capacity
40. (g)(2)(B)	Understand symmetry
41. (g)(2)(C)	Find area and volume
42. (g)(3)(A)	Determine distance and betweeness
43. (g)(3)(B)	Measure angles
44. (i)(1)(A)	Understand aspects of free enterprise system and its benefits
45. (i)(1)(B)	Investigate wages and deductions
46. (i)(1)(C)	Investigate benefits offered by companies, unions, and organizations
47. (i)(1)(D)	Investigate Social Security and Income Tax
48. (i)(2)(A)	Understand credit financing
49. (i)(2)(C)	Investigate local bank services
50. (i)(2)(E)	Investigate different types of loans
51. (i)(2)(F)	Investigate types of institutions that offer loans
52. (i)(3)(A)	Food, shelter, clothes
53. (i)(3)(B)	Transportation
54. (i)(3)(C)	Insurance
55. (i)(3)(D)	Medical and dental expenses
56. (i)(3)(E)	Education
57. (i)(3)(F)	Retirement and annuities
58. (i)(3)(G)	Miscellaneous
59. (i)(4)(A)	Make informed consumer decisions
60. (i)(4)(B)	Practice sound money management

Science:	75.64
1. (b)(2)(A)	Observe chemical reactions
2. (b)(4)(A)	Describe chemical processes
3. (b)(4)(B)	Explain meaningful arrangements of chemical information
4. (b)(5)(A)	Measure chemical quantities
5. (c)(5)(A)	Measure physical quantities
6. (c)(7)(B)	Compare the functions of electronic circuits
7. (c)(7)(C)	Compare the electrical efficiency of appliances
8. (c)(10)(A)	Apply principles of physics to an investigation
9. (d)(2)(A)	Observe physical and chemical properties of matter
10. (d)(2)(B)	Observe the effects of forces on matter
11. (d)(2)(C)	Explore magnetic and electrical interactions
12. (d)(9)(B)	Manage an experimental apparatus to test a physical science hypothesis
13. (d)(10)(A)	Finalyze the use of chemicals in everyday activities of the home
14. (f) (1) (A)	Demonstrate the safe use of laboratory chemicals and equipment
15. (g)(5)(B)	Plot data on graphs and other displays
16. (h)(7)(A)	Compare physical interactions under varied conditions
17. (h)(7)(B)	Evaluate the electrical efficiency of machines
18. (i)(2)(B)	Examine earth materials (construction)
19. (l)	Marine Science (the EE's of our few marine related programs should be compared to those in this course)
20. (n)(2)(B)	Study safety hazards encountered by students and methods of eliminating the hazards
21. (n)(4)(A)	Communicate laboratory and safety directions
22. (p)(l)(E)	Develop skills in using materials and devices in a manner that minimizes danger to self and to society and maintains an acceptable level of erosion of the environment (safety practices, waste disposal)
23. (p)(2)(A)	Organize thought process to accomplish goals (applications of electronics, photography)
24. (p)(2)(E)	Adjust constructively to variations in needs resulting from individual differences that exist both within and among cultures in a healthy society
25. (p)(4)(D)	Consider the consequences of personal actions (safety, chemical disposal)
26. (p)(4)(D)	Develop a sense of personal worth in doing things for pleasure as well as in doing for others (hobbies)

Note:	**75.64(Q) and (R) relating to aerospace-aviation should be compared to T & I Aviation related course EE's.**
(q)(1)(B)	Demonstrate investigative procedures and techniques
(q)(4)(A)	Describe emergency procedures
(r)(7)(C)	Analyze radio navigation systems (will be in some electronics or media technology courses)

Social Studies	**75.48**
1. (a)(l)(A)	Respect beliefs of other individuals
2. (a)(l)(D)	Recognize that individuals must accept the consequences of their decisions
3. (a)(2)(A)	Respect the principles that underlie the Texas and the United States Constitutions, the Bill of Rights, and the Declaration of Independence
4. (a)(2)(C)	Value open-mindedness, tolerance of differing opinions, and civic participation as important aspects of democratic behavior
5. (a)(2)(D)	Respect the laws of one's society and work responsibly to change laws that one judges to be unjust
6. (a) (2) (E)	Understand the importance of individuals participation in civic affairs
7. (a)(2)(G)	Recognize the value of compromise in the democratic process
8. (a)(2)(J)	Support the democratic processes of the republican form of government
9. (a)(2)(K)	Support the basic values of American society (e.g., justice, responsibilities, freedom, respect for the law, diversity, privacy, private property rights, free enterprise, and voluntary exchange)
10. (a)(2)(L)	Support the rules and laws of one's school, community, state, and nation
11. (a)(3)(B)	Support the role of profit in the American market system
12. (a)(3)(E)	Recognize that citizens, through legal political activities, can influence economic decisions made by government
13. (a)(4)(A)	Locate and gather information
14. (a)(4)(B)	Observe for detail
15. (a)(4)(C)	Translate information from one medium to another
16. (a)(4)(D)	Organize and express ideas in written form
17. (a)(4)(E)	Distinguish fact from opinion
18. (a)(4)(F)	Analyze information
19. (a)(4)(G)	Draw conclusions
20. (a)(4)(H)	Synthesize information
21. (a)(4)(J)	Use problem-solving skills

Social Studies:	**75.68**
1. (b)(3)(D)	Explain the development and importance of new business and labor organizations
2. (i)(3)(A)	Analyze the development of self concept
3. (i)(3)(C)	Establish individual long- and short-range goals
4. (k)(2)(D)	Undertake personal leadership in groups
5. (k)(2)(E)	Accept leadership of others

Texas Assessment of Academic Skills
Instructional Targets
Language Arts

DOMAIN: **Reading Comprehension**

Objective 1: The student will determine the meaning of words in a variety of written texts.

Objective 2: The student will identify supporting ideas in a variety of written texts.

Objective 3: The student will summarize a variety of written texts.

Objective 4: The student will perceive relationships and recognize outcomes in a variety of written texts.

Objective 5: The student will analyze information in a variety of written texts in order to make inferences and generalizations.

Objective 6: The student will recognize points of view, propaganda, and/or statements of fact and nonfact in a variety of written texts.

Texas Assessment of Academic Skills
Instructional Targets
Mathematics

DOMAIN: **Concepts**

Objective 1: The student will demonstrate an understanding of number concepts.

Objective 2: The student will demonstrate an understanding of mathematical relations, functions, and other algebraic concepts.

Objective 3: The student will demonstrate an understanding of geometric properties and relationships.

Objective 4: The student will demonstrate an understanding of measurement concepts using metric and customary units.

Objective 5: The student will demonstrate an understanding of probability and statistics.

DOMAIN: **Operations**

Objective 6: The student will use the operation of addition to solve problems.

Objective 7: The student will use the operation of subtraction to solve problems.

Objective 8: The student will use the operation of multiplication to solve problems.

Objective 9: The student will use the operation of division to solve problems.

DOMAIN: **Problem Solving**

Objective 10: The student will estimate solutions to a problem situation.

Objective 11: The student will determine solution strategies and will analyze or solve problems.

Objective 12: The student will express or solve problems using mathematical representation.

Objective 13: The student will evaluate the reasonableness of a solution to a problem situation.

Texas Assessment of Academic Skills
Instructional Targets
Written Communication

DOMAIN: Written Communication

Objective 1: The student will respond appropriately in a written composition to the purpose/audience specified in a given topic.

Objective 2: The student will organize ideas in a written composition on a given topic.

Objective 3: The student will demonstrate control of the English language in a written composition on a given topic.

Objective 4: The student will generate a written composition that develops/supports/elaborates the central idea stated in a given topic.

Objective 5: The student will recognize appropriate sentence construction within the context of a written passage.

Objective 6: The student will recognize appropriate English usage within the context of a written passage.

Objective 7: The student will recognize appropriate spelling, capitalization, and punctuation within the context of a written passage.

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-1-LP	N/A	(b)(2)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (e)(2)(D)	(i)(3)(A) (k)(2)(E) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7
II-1-LP-1	(a)(1)(A) (a)(1)(C)	(b)(4)(B) (f)(1)(A) (g)(5)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (d)(4)(G)	(i)(3)(A) (i)(3)(C) (k)(2)(E) (a)(4)(J)	LAR; obj. 1 LAW; obj. 3, 7 Math; obj. 3, 4
II-1-LP-2	N/A	(c)(10)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(k)(2)(E) (a)(4)(J) (a)(2)(L) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(F) (a)(4)(G) (a)(4)(H)	LAW; obj. 6, 7 LAR; obj. 1, 4, 5
II-1-LP-3	N/A	(c)(10)(A) (p)(1)(E) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(k)(2)(E) (a)(4)(J) (a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 3, 4, 5

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-2-LP	N/A	(b)(2)(A) (b)(4)(A) (c)(10)(A) (h)(7)(A) (p)(1)(E) (p)(4)(D)	(b)(4)(A) (e)(2)(D)	(a)(4)(B) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 4, 5 LAW; obj. 3, 6, 7
II-3-LP	N/A	(b)(2)(A) (b)(4)(A) (b)(4)(B) (d)(2)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (e)(2)(D)	(a)(4)(B) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 4, 5 LAW; obj. 3, 6, 7
II-3-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-3-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12
II-3-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12
II-3-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-3-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12
II-3-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12
II-3-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(10)(D)	(b)(5)(A) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)	(a)(4)(B) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAW; obj. 7 LAR; obj. 1, 4, 5 Math; obj. 3, 4, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-4-LP	N/A	(c)(7)(B) (d)(2)(C) (h)(7)(B) (n)(2)(B)	(b)(4)(A) (c)(4)(F)	(a)(4)(A) (a)(4)(B) (a)(4)(F)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7
II-4-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-4-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-4-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-4-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-4-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-4-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (A)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-4-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (A)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-4-LP-8	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-5-LP	N/A	(c)(7)(B) (d)(2)(C) (h)(7)(B) (n)(2)(B)	(b)(4)(A) (c)(4)(F)	(a)(4)(A) (a)(4)(B) (a)(4)(F)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7
II-5-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-5-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-5-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-5-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-5-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-5-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-5-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(D) (d)(10)(D)	(c)(7)(B) (d)(2)(C) (f)(1)(A) (h)(7)(B) (n)(2)(B) (n)(4)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-6-LP	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-1	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-2	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-6-LP-3	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-4	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-5	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-6-LP-6	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-7	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-8	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-6-LP-9	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-6-LP-10	(a)(1)(A) (a)(1)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
II-7-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-7-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9
II-7-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9
II-7-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-7-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9
II-7-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9
II-7-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-7-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9
II-7-LP-8	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(5)(C) (c)(3)(B) (c)(4)(C) (c)(4)(D) (g)(2)(C)	(b)(5)(A) (c)(5)(A) (n)(2)(B) (q)(4)(A)	(b)(4)(A) (d)(4)(G)) (e)(2)(D)	(a)(4)(A) (a)(4)(C) (a)(4)(E) (a)(4)(J)	LAR; obj. 4, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 4, 5, 6, 7, 8, 9

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-8-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(4)(A) (d)(2)(A) (d)(9)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12
II-8-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(4)(A) (d)(2)(A) (d)(9)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-8-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(3)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(4)(A) (d)(2)(A) (d)(9)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E)	(b)(4)(A) (c)(4)(F)) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12
II-9-LP	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-9-LP-1	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-9-LP-2	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-9-LP-3	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-9-LP-4	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-9-LP-5	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-9-LP-6	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-9-LP-7	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(c)(10)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (g)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-10-LP-6	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-10-LP-7	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-10-LP-8	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-10-LP-9	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-10-LP-10	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-10-LP-11	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-10-LP-12	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(B) (a)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (d)(4)(B) (d)(4)(D) (d)(9)(B) (d)(10)(D) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(4)(B) (b)(5)(A) (d)(2)(A) (d)(2)(B) (f)(1)(A) (n)(2)(B) (n)(4)(A) (p)(1)(E) (q)(4)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (k)(2)(E)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6, 7 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
II-11-LP	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-11-LP-1	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-11-LP-2	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-11-LP-3	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-11-LP-4	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-12-LP	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-12-LP-1	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-12-LP-2	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-12-LP-3	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-12-LP-4	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-12-LP-5	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(4)(A) (p)(2)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-12-LP-6	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-12-LP-7	(a)(1)(A) (a)(1)(C) (a)(3)(A) (a)(3)(C) (c)(4)(C) (d)(1)(A) (d)(6)(C)	(n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 3, 4 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9
II-13-LP	(a)(1)(A) (a)(1)(C) (a)(5)(C)	(f)(1)(B) (n)(2)(A) (p)(4)(D) (b)(4)(B) (b)(5)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(b)(3)(D) (a)(4)(A) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAW; obj. 1, 3, 4 LAR; obj. 1, 2
II-13-LP-1	(a)(1)(A) (a)(1)(C) (a)(5)(C)	(f)(1)(B) (n)(2)(A) (p)(4)(D) (b)(4)(B) (b)(5)(A)	b)(4)(A) (c)(4)(F) (e)(2)(D)	(b)(3)(D) (a)(4)(A) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAW; obj. 1, 3, 4 LAR; obj. 1, 2

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
II-13-LP-2	(a)(1)(A) (a)(1)(C) (a)(5)(C)	(f)(1)(B) (n)(2)(A) (p)(4)(D) (b)(4)(E) (b)(5)(A)	(b)(4)(A) (c)(4)(F) (e)(2)(D)	(b)(3)(D) (a)(4)(A) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAW; obj. 1, 3, 4 LAR; obj. 1, 2
II-13-LP-3	(a)(1)(A) (a)(1)(C) (a)(5)(C)	(f)(1)(B) (n)(2)(A) (p)(4)(D) (b)(4)(B) (b)(5)(A)	b)(4)(A) (c)(4)(F) (e)(2)(D)	(b)(3)(D) (a)(4)(A) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAW; obj. 1, 3, 4 LAR; obj. 1, 2

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-1-LP	(a)(1)(A) (a)(1)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(A)	N/A	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 3 LAW; obj. 1, 2 Math; obj. 1, 2, 4, 6, 7, 8, 9
III-2-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4
III-2-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4
III-2-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4
III-2-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-2-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4
III-2-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4
III-2-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(C) (a)(5)(C) (a)(3)(A) (c)(4)(C) (d)(1)(A)	(b)(2)(A) (b)(4)(A) (n)(2)(B) (p)(1)(E) (f)(1)(A)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-3-LP	(a)(1)(A) (a)(1)(C) (c)(1)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9
III-3-LP-1	(a)(1)(A) (a)(1)(C) (c)(1)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9
III-3-LP-2	(a)(1)(A) (a)(1)(C) (c)(1)(B) (c)(3)(C) (c)(4)(C) (c)(4)(D) (d)(1)(A) (d)(1)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (b)(5)(A) (f)(1)(A) (n)(2)(B) (p)(1)(E)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-4-LP	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(C) (a)(5)(C) (d)(1)(A) (g)(3)(A)	(c)(5)(A) (d)(2)(C) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9
III-4-LP-1	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(C) (a)(5)(C) (d)(1)(A) (g)(3)(A)	(c)(5)(A) (d)(2)(C) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9
III-4-LP-2	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(C) (a)(5)(C) (d)(1)(A) (g)(3)(A)	(c)(5)(A) (d)(2)(C) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-4-LP-3	(a)(1)(A) (a)(1)(B) (a)(3)(A) (a)(3)(C) (a)(5)(C) (d)(1)(A) (g)(3)(A)	(c)(5)(A) (d)(2)(C) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 4, 5 LAW; obj. 5, 6 Math; obj. 1, 2, 4, 6, 7, 8, 9
III-5-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(B) (d)(6)(C) (g)(3)(A)	(b)(5)(A) (c)(5)(A) (g)(5)(B)	(a)(4)(A) (a)(4)(F) (a)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (i)(3)(A)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 1, 3, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-5-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(B) (d)(6)(C) (g)(3)(A)	(b)(5)(A) (c)(5)(A) (g)(5)(B)	(a)(4)(A) (a)(4)(F) (a)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (i)(3)(A)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 1, 3, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
III-5-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(B) (d)(6)(C) (g)(3)(A)	(b)(5)(A) (c)(5)(A) (g)(5)(B)	(a)(4)(A) (a)(4)(F) (a)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (i)(3)(A)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 1, 3, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-5-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(B) (d)(6)(C) (g)(3)(A)	(b)(5)(A) (c)(5)(A) (g)(5)(B)	(a)(4)(A) (a)(4)(F) (a)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (i)(3)(A)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 1, 3, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13
III-5-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (c)(4)(C) (d)(1)(B) (d)(6)(C) (g)(3)(A)	(b)(5)(A) (c)(5)(A) (g)(5)(B)	(a)(4)(A) (a)(4)(F) (a)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(F) (a)(4)(G) (a)(4)(H) (a)(4)(J) (i)(3)(A)	LAR; obj. 1, 2, 3, 4, 5 LAW; obj. 1, 3, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
III-6-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(C) (a)(5)(D)	(c)(5)(A) (g)(5)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 4, LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10
III-6-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(C) (a)(5)(D)	(c)(5)(A) (g)(5)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 4, LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10
III-6-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(C) (a)(5)(D)	(c)(5)(A) (g)(5)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 4, LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10
III-6-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(C) (a)(5)(D)	(c)(5)(A) (g)(5)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 4, LAW; obj. 1, 4, 5 Math; obj. 1, 2, 4, 6, 7, 8, 9, 10

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-1-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-1-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-1-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-1-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-1-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-1-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-1-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-2-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-2-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-2-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-2-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-2-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-2-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-2-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-2-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-2-LP-8	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-2-LP-9	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-2-LP-10	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-2-LP-11	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (b)(1)(A) (c)(4)(C) (c)(4)(D) (d)(1)(B) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(10)(A) (d)(2)(A) (d)(2)(C) (n)(2)(B) (n)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-3-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
IV-3-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-3-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
IV-3-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-3-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
IV-3-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-3-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(5)(C) (a)(6)(E) (c)(4)(C) (c)(4)(D) (g)(3)(B) (g)(2)(C)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 4, 5 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12
IV-4-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(6)(E) (b)(1)(A) (c)(3)(B) (c)(4)(C) (d)(1)(B) (d)(4)(D) (g)(2)(C) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-4-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(6)(E) (b)(1)(A) (c)(3)(B) (c)(4)(C) (d)(1)(B) (d)(4)(D) (g)(2)(C) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
IV-4-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(6)(E) (b)(1)(A) (c)(3)(B) (c)(4)(C) (d)(1)(B) (d)(4)(D) (g)(2)(C) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-4-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(6)(E) (b)(1)(A) (c)(3)(B) (c)(4)(C) (d)(1)(B) (d)(4)(D) (g)(2)(C) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
IV-4-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(6)(E) (b)(1)(A) (c)(3)(B) (c)(4)(C) (d)(1)(B) (d)(4)(D) (g)(2)(C) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

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Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-4-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(6)(E) (b)(1)(A) (c)(3)(B) (c)(4)(C) (d)(1)(B) (d)(4)(D) (g)(2)(C) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (d)(2)(C) (h)(7)(A) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(D) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-5	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-6	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-7	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-8	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-9	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-10	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-11	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-5-LP-12	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(3)(B) (c)(4)(C) (d)(1)(A) (d)(1)(B) (d)(6)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (d)(2)(C) (n)(2)(B) (p)(2)(A) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(E) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 3, 5 LAW; obj. 1, 2 Math; obj. 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13
IV-6-LP	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(4)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 4, 5, 6, 7, 8, 9, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-6-LP-1	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(4)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 4, 5, 6, 7, 8, 9, 11, 12
IV-6-LP-2	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(4)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 4, 5, 6, 7, 8, 9, 11, 12

General Mechanical Repair
Matrix

Lesson Plan #	Math	Science	Language Arts	Social Studies	TAAS Objectives
IV-6-LP-3	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(4)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 4, 5, 6, 7, 8, 9, 11, 12
IV-6-LP-4	(a)(1)(A) (a)(1)(B) (a)(1)(C) (a)(3)(A) (a)(3)(B) (a)(3)(C) (a)(5)(C) (a)(5)(G) (a)(6)(E) (c)(4)(C) (g)(3)(A) (g)(3)(B)	(b)(2)(A) (b)(4)(A) (c)(5)(A) (c)(7)(B) (n)(2)(B) (p)(4)(D)	(b)(4)(A) (c)(4)(F) (d)(1)(A) (d)(4)(G) (e)(2)(D)	(a)(4)(A) (a)(4)(B) (a)(4)(C) (a)(4)(D) (a)(4)(F) (a)(4)(G) (a)(4)(J)	LAR; obj. 1, 2, 5 LAW; obj. 1, 2, 5 Math; obj. 1, 2, 4, 5, 6, 7, 8, 9, 11, 12

HOW TO USE THE CURRICULUM GUIDE
FOR
GENERAL MECHANCAL REPAIR

General Mechanical Repair is the two-hour, one year (350 hour, 2 credits) instructional program with suggested activities for an additional 175 hours of enhanced activities for the three unit (525-hour/one-year) program.

Organizational Design

Materials in this guide may be used in either of two ways.

It may be used to help instructors prepare their lesson plans. In this instance, the student's reference text could serve as the text. Other useful information for instructors is the instructional delivery outline, the list of essential elements common to all trade and industrial courses and the unit and topic objectives.

Or, Curriculum Guide, Lesson Plans, Student Manual, and Competency Test Packets may be purchased from:

Educational Development and Training Center
East Texas State University
E. T. Station
Commerce, Texas 75429
(903) 886-5624
1-800-356-EDTC

This course addresses the common essential elements for Trade and Industrial Education. While the primary purpose of this guide is to assist the teacher in the course, it may be used in other ways.

Pages 5 through 7 of this guide list essential elements common to all trade and industrial courses. The listing of essential elements for this course is on page 7.

An instructional delivery outline (teaching sequence) for the course is contained on pages 9 through 18. The instructional delivery outline contains the various sections, units, and topics of instruction; listing the essential elements covered in each topic; identification of instructional materials; and recommended hours of instruction for each unit of instruction.

The next section of the guide, pages 19 through 32, provides the objectives of each unit and the specific objectives to be met upon completion of each topic. These should be particularly useful to teachers who plan to prepare their own lessons.

Page 33 of this guide lists the resources developed for this course. These materials may be used in teaching the topics of instruction. If the suggested curriculum materials listed are used, the essential element requirements will be met.

The Appendix of this guide contains information covering Modification Techniques for Special Populations.

Instructional Materials

This course is divided into four basic sections of instructional materials. The first section covers the common essential elements for trade and industrial education. It is recommended that safety be covered prior to progressing into the specific course content. The remainder of the common essential elements may be introduced into the teaching sequence at the discretion of the instructor.

The remaining sections of materials may be taught in any order. These sections are:

Minor Automotive Maintenance
Small Engine Repair
Welding

Lesson Plans

The lesson plans are intended to assist instructors and administrators of the General Mechanical Repair program. Each lesson plan provides a listing of essential elements addressed; objectives; identification of type of lesson (cognitive or psychomotor); tools or equipment; materials; teaching aids; and references needed. Additional recommendations are made for teacher activities, student activities, evaluation/ verification, summary/closure, and reminder of upcoming lesson topics.

Included with the lesson plans are: Answers to Assignment Sheets for General Mechanical Repair and Answers to Competency Tests for General Mechanical Repair. These are located in Appendix A and B.

Student Materials Manual

The student materials manual includes information sheets, assignment sheets, and job sheets. The assignment sheets help the students master the technical information, while the job sheets provide applications of technical information with hands-on activities. Answers to assignment sheets are provided in Appendix A of General Mechanical Repair - Lesson Plans.

Competency Test Package

The competency tests have been designed to serve two purposes. They may be used as pretests to access the students' current level of knowledge or as competency tests to ascertain the students' level of mastery of the subject. Answers to competency tests are provided in Appendix B of General Mechanical Repair - Lesson Plans.

GENERAL MECHANICAL REPAIR

I. Common Essential Elements

II. Minor Automotive - 180 Hours

Shop Safety
Engine Principles
Fuel Systems
Electrical Systems
Ignition Systems
Lubrication Systems
Engine Cooling Systems
Exhaust System
Wheels and Tires
Brake and Bearings
Frame Suspension and Steering
Drive Line
Cleaning the Car

III. Small Engine - 70 Hours

Engine Principles
Principles of Carburetion
Lubrication System
Starter System
Measurement and Instruments
Troubleshooting

IV. Welding - 104 hours

Introduction to Oxyacetylene Welding
Oxyacetylene Welding Positions and Applications
Using the Cutting Torch
Shielded Metal Arc Welding
Welding Joints and Positions
MIG Welding

COMMON ESSENTIAL ELEMENTS

75.88 Trade and Industrial Education

(a) The elements in this subsection are common to all trade and industrial courses unless otherwise indicated and shall be included in each course at the appropriate level. They are described here to preclude repetitions in each course. Every school offering trade and industrial education shall provide courses which include the following essential elements:

(1) Leadership concepts and skills. The student shall be provided opportunities to:

(A) demonstrate skills, characteristics, and responsibilities of leaders and effective group members;

(B) demonstrate a knowledge of parliamentary procedure principles;

(C) plan and conduct leadership activities; and

(D) prepare for effective citizenship and for participation in our democratic society.

(2) Concepts and skills related to successful employment and/or postsecondary training. The student shall be provided opportunities to:

(A) identify employment opportunities and preparation requirements in chosen fields;

(B) identify effective methods to secure and terminate employment;

(C) demonstrate effective communication skills both oral and written and follow through on assigned tasks;

(D) demonstrate dependability and punctuality;

(E) demonstrate productive work habits and attitudes;

(F) understand the importance of taking pride in the quality of work performed;

(G) recognize the dignity in work;

(H) develop skills in planning and organizing work;

(I) apply required methods and sequences when performing tasks;

(J) apply principles of time management and work simplification when performing assigned tasks;

(K) identify ethical practices and responsibilities; and

(L) understand the importance of the application of organizational policies and procedures.

(3) Concepts and skills associated with entrepreneurship. The student shall be provided opportunities to:

(A) identify opportunities for business ownership;

(B) understand the risk and profit motive factor;

(C) understand the elements and advantages of the free enterprise system; and

(D) explain the role of small business in the free enterprise system.

(4) Concepts and skills related to safety and safe working conditions. The student shall be provided opportunities to identify and apply safe working practices to all training situations.

(5) Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:

(A) understand the importance of maintaining good health and proper appearance for effective job performance;

(B) understand oneself and others;

(C) exercise self-control;

(D) accept and use criticism;

(E) recognize basic human relationships as they relate to business success; and

(F) demonstrate characteristics for successful working relationships.

(6) Concepts and skills related to personal and business management. The student shall be provided opportunities to:

(A) explain how management assists in reaching personal and family goals;

(B) explain the management process;

(C) describe the role of management in controlling stress;

(D) identify and understand personal checking accounts;

(E) identify and understand personal loan application processes;

(F) identify and understand different financial institutions;

(G) identify the role and function of business management:

(H) understand the lines of authority; and

(I) identify effective supervisory techniques.

(7) Concepts and skills associated with the specific occupation being taught. The student shall be provided opportunities to:

(A) understand the basic concepts of and develop proficiency in the occupational area for which instruction/training is provided;

(B) develop a fundamental understanding of mathematical principles and scientific procedures;

(C) understand terminology utilized;

(D) identify tools, equipment, and materials used; and

(E) develop and demonstrate appropriate techniques for the selection, use, maintenance, and storage of tools, equipment, and materials.

(ddd)Coordinated vocational-academic education (CVAE)—general mechanical repair (2-3 units) shall include the essential trade and industrial education elements and the following essential elements:

(1) Concepts and skills associated with automobile mechanics. The student shall be provided opportunities to:

(A) understand the functions of the major automobile components;

(B) perform basic preventive maintenance functions on the automobile;

(C) demonstrate proper techniques in performing a tune-up on an automobile; and

(D) remove, repair, and replace automobile brake system components.

(2) Concepts and skills associated with small engine repair. The student shall be provided opportunities to:

(A) understand the functions of the small gasoline engine and its components;

(B) identify types of small gasoline engines;

(C) understand the proper fuel and fuel mixtures required for various types of small engines;

(D) service and repair small engine fuel systems, lubrication systems, and starting systems; and

(E) troubleshoot and repair small engines.

(3) Concepts and skills associated with welding. The student shall be provided opportunities to:

(A) understand the basic theory of oxyfuel welding, brazing, and cutting;

(B) utilize the oxyfuel cutting process to produce freehand cuts;

(C) weld and braze metal plate using the oxyfuel process;

(D) understand the basic theory of shielded metal arc welding; and

(E) utilize the shielded metal arc process to weld butt and tee joints on metal plate.

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Minor Automotive Maintenance			
Minor Automotive Shop Safety	(a)(4) (a)(7)(A) (a)(7)(E) (ddd) (1) (B)	I-1-A	6
Engine Principles	(a)(4) (a)(7)(A) (a)(7) (E) (ddd) (1) (B)	I-2-A	12
Fuel Systems Operation and Repair	(a)(4) (a)(7)(A) (a)(7)(D) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-3-A	20
Electrical System	(a)(4) (a)(7)(A) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-4-A	18
Ignition System	(a)(4) (a)(7)(A) (a)(7) (E) (ddd) (1) (A) (ddd) (1) (B) (ddd) (1) (C)	I-5-A	16

INSTRUCTIONAL DELIVERY OUTLINE
(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Minor Automotive Maintenance			
Lubrication System	(a) (4) (a) (7) (A) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-6-A	16
Engine Cooling System	(a) (4) (a) (7) (A) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-7-A	12
Exhaust System	(a) (4) (a) (7) (A) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-8-A	12
Wheels and Tires	(a) (4) (a) (7) (A) (a)(7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-9-A	8
Brake and Bearing Systems	(a) (4) (a) (7) (A) (a)(7) (E) (ddd) (1) (A) (ddd) (1) (B) (ddd) (1) (D)	I-10-A	20

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Minor Automotive Maintenance			
Frame, Suspension and Steering	(a) (4) (a) (7) (A) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-11-A	18
Drive Line	(a) (4) (a) (7) (A) (a) (7) (E) (ddd) (1) (A) (ddd) (1) (B)	I-12-A	18
Cleaning the Car	(a) (4) (a) (7) (A) (a) (7) (E) (ddd) (1) (B)	I-13-A	8
Total Hours of Basic Instruction			180

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Small Engine			
Engine Principles	(a) (4) (a) (7) (A) (a) (7) (C) (a) (7) (D) (a) (7) (E) (ddd) (2) (A) (ddd) (2) (B)	II-1-A	8
Principles of Carburetion	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (C) (a) (7) (E) (ddd) (2) (A) (ddd) (2) (C) (ddd) (2) (D)	II-2-A	16
Lubrication System	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (C) (a) (7) (D) (ddd) (2) (A) (ddd) (2) (D)	II-3-A	12

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Small Engine			
Starter Systems	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (C) (a) (7) (D) (a) (7) (E) (ddd) (2) (A) (ddd) (2) (D)	II-4-A	10
Measurement and Instruments	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (C) (a) (7) (D) (a) (7) (E) (ddd) (2) (A) (ddd) (2) (B) (ddd) (2) (C) (ddd) (2) (D) (ddd) (2) (E)	II-5-A	12

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INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Troubleshooting	(a) (4) (a) (7) (A) (a) (7) (C) (a) (7) (D) (a) (7) (E) (ddd) (2) (A) (ddd) (2) (B) (ddd) (2) (C) (ddd) (2) (D) (ddd) (2) (E)	II-6-A	12
Total Hours of Basic Instruction			70

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Welding			
Introduction to Welding	(a) (4) (a) (7) (B) (a) (7) (B) (a) (7) (C) (a) (7) (D) (ddd) (3) (A) (ddd) (3) (B) (ddd) (3) (C)	III-1-A	10
Oxyacetylene Welding Positions and Applications	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (C) (a) (7) (D) (ddd) (3) (A) (ddd) (3) (B) (ddd) (3) (C)	III-2-A	20
Using the Cutting Torch	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7)(C) (a) (7) (D) (ddd) (3) (A) (ddd) (3) (B)	III-3-A	20

INSTRUCTIONAL DELIVERY OUTLINE

(Teaching Sequence)

Units and Topics of Instruction	Essential Elements	Materials	Hours
Welding			
Introduction to Shielded Metal Arc Welding	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (D) (ddd) (3) (A) (ddd) (3) (E)	III-4-A	16
Welding Joints and Positions	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (D) (ddd) (3)(A) (ddd) (3) (E)	III-5-A	20
MIG Welding	(a) (4) (a) (7) (A) (a) (7) (B) (a) (7) (C) (a) (7) (D) (a) (7) (E) (ddd) (7) (D) (ddd) (7) (E)	III-6-A	18
Total Hours of Basic Instruction			104

OBJECTIVES

SECTION II: Minor Automotive Maintenance

UNIT 1: Automotive Shop Safety

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify safety and point out unsafe practices in the automotive shop.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will participate in safety operations and practices in the automotive shop.

After completing this lesson, the student(s) will be able to make effective safety posters.

After completing this lesson, the student(s) will be able to inspect an automotive shop correctly.

After completing this lesson, the student(s) will be able to place a car on a jack stand correctly.

UNIT 2: Engine Principles

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to define the major engine parts and discuss their relationship to one another.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to discuss four-cycle engines and the relation of the crankshaft, pistons, rods, valves, and bearings.

UNIT 3: Fuel System Operation and Repair

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will understand parts of the fuel system.

After completing this lesson, the student(s) will be able to remove the fuel tank correctly.

After completing this lesson, the student(s) will be able to repair fuel tank correctly.

After completing this lesson, the student will be able to check fuel systems correctly for leaks.

After completing this lesson, the student(s) will be able to remove and replace fuel pump correctly.

After completing this lesson, the student(s) will be able to clean and replace fuel filter correctly.

After completing this lesson, the student(s) will be able to check and replace needle valve in carburetor correctly.

After completing this lesson, the student(s) will be able to remove and/or replace air filter correctly.

UNIT 4: Electrical System

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to find and repair open and shorted circuits.

After completing this lesson, the student(s) will be able to test light bulbs correctly.

After completing this lesson, the student(s) will be able to splice wires correctly.

After completing this lesson, the student(s) will be able to solder wire connections correctly.

After completing this lesson, the student(s) will be able to perform wiring test correctly.

After completing this lesson, the student(s) will be able to identify batteries and voltages correctly.

After completing this lesson, the student(s) will be able to remove, clean and replace a battery.

After completing this lesson, the student(s) will be able to use a hydrometer to check batteries properly.

After completing this lesson, the student(s) will be able to connect, operate, and disconnect a battery charger properly.

UNIT 5: Ignition System

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test, and service the ignition system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will explain the purpose of the ignition system, test and replace ignition parts.

After completing this lesson, the student(s) will be able to change spark plugs correctly.

After completing this lesson, the student(s) will be able to change the breaker points and condenser correctly.

After completing this lesson, the student(s) will be able to change spark plug wires.

After completing this lesson, the student(s) will be able to inspect the distributor cap.

After completing this lesson, the student(s) will be able to use the tachometer.

After completing this lesson, the student(s) will be able to check the ignition timing.

After completing this lesson, the student(s) will be able to use the voltmeter.

UNIT 6: Lubrication System

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will understand the use of lubricants and the lubrication system, identify and service parts as needed.

After completing this lesson, the student(s) will be able to check the engine oil level.

After completing this lesson, the student(s) will be able to change engine oil.

After completing this lesson, the student(s) will be able to change engine oil filter.

After completing this lesson, the student(s) will be able to check automatic transmission fluid level.

After completing this lesson, the student(s) will be able to change automobile transmission fluid.

After completing this lesson, the student(s) will be able to check standard transmission oil level.

After completing this lesson, the student(s) will be able to check differential oil level.

After completing this lesson, the student(s) will be able to check the manual steering gear oil level.

After completing this lesson, the student(s) will be able to check the power steering pump oil level.

After completing this lesson, the student(s) will be able to lubricate the chassis.

UNIT 7: Engine Cooling System

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to test, check and replace parts of the cooling system.

After completing this lesson, the student(s) will be able to pressure check the radiator.

After completing this lesson, the student(s) will be able to check the pressure on the radiator cap.

After completing this lesson, the student(s) will be able to inspect the water pump properly.

After completing this lesson, the student(s) will be able to remove and replace the thermostat.

After completing this lesson, the student(s) will be able to test the thermostat for operation.

After completing this lesson, the student(s) will be able to remove, inspect, and replace the hoses correctly.

After completing this lesson, the student(s) will be able to inspect fan belts and set the tension.

After completing this lesson, the student(s) will be able to test, remove, and replace the fan clutch.

UNIT 8: Exhaust System

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to examine and replace components of the exhaust system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will test, remove, and replace components in the exhaust system and explain the purpose of each component.

After completing this lesson, the student(s) will be able to change a tail pipe correctly.

After completing this lesson, the student(s) will be able to change the muffler.

UNIT 9: Wheels and Tires

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) inspect, test, and service wheels and tires.

After completing this lesson, the student(s) will be able to remove and install a wheel correctly.

After completing this lesson, the student(s) will be able to inspect a wheel for damage.

After completing this lesson, the student(s) will be able to remove a tire from the rim.

After completing this lesson, the student(s) will be able to install a tire on the rim correctly.

After completing this lesson, the student(s) will be able to repair a punctured tire correctly.

After completing this lesson, the student(s) will be able to statically balance a wheel and tire correctly.

After completing this lesson, the student(s) will be able to rotate bias-ply tires, including the spare.

UNIT 10: Brake and Bearing Systems

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to service, remove and replace components in the braking system and dispose of brake waste material.

After completing this lesson, the student(s) will be able to inspect a brake system correctly.

After completing this lesson, the student(s) will be able to service a master cylinder and a power booster correctly.

After completing this lesson, the student(s) will be able to replace brake shoes correctly.

After completing this lesson, the student(s) will be able to rebuild a wheel cylinder correctly.

After completing this lesson, the student(s) will be able to bleed a hydraulic system correctly.

After completing this lesson, the student(s) will be able to remove and replace disc brake pads correctly.

After completing this lesson, the student(s) will be able to service the rotor and pads correctly.

After completing this lesson, the student(s) will be able to recondition a disc brake caliper correctly.

After completing this lesson, the student(s) will be able to adjust the park brake correctly.

After completing this lesson, the student(s) will be able to remove wheel bearings correctly.

After completing this lesson, the student(s) will be able to clean, inspect and pack bearings correctly.

After completing this lesson, the student(s) will be able to install wheel bearings correctly.

UNIT 11: Minor Automotive Maintenance

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify major steeering and suspension components.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to repair and replace parts of the steering and suspension system.

After completing this lesson, the student(s) will be able to remove and replace front shock absorber correctly.

After completing this lesson, the student(s) will be able to remove and replace the rear shock absorber correctly.

After completing this lesson, the student(s) will be able to remove and replace the tie rod end correctly.

After completing this lesson, the student(s) will be able to remove and replace the idler arm correctly.

UNIT 12: Drive Line

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to replace components of the drive line correctly.

After completing this lesson, the student(s) will be able to remove aand replace a speedometer drive gear correctly.

After completing this lesson, the student(s) will be able to remove and replace the drive shaft correctly.

After completing this lesson, the student(s) will be able to remove and replace the universal joint cross and roller bearings correctly.

After completing this lesson, the student(s) will be able to remove and replace a speedometer drive gear correctly.

After completing this lesson, the student(s) will be able to remove and replace the transmission support correctly.

After completing this lesson, the student(s) will be able to replace the rear transmission seal correctly.

After completing this lesson, the student(s) will be able to remove and replace the rear axle bearing correctly.

UNIT 13: Cleaning the Car

UNIT OBJECTIVE:

After completing this unit, the student(s) will be able to identify cleaning materials and equipment, clean interior and exterior of the car and wax surfaces.

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to clean interior, exterior, upholstery, vacuum the interior and wax the exterior.

After completing this lesson, the student(s) will be able to wash the car exterior correctly.

After completing this lesson, the student(s) will be able to wax the car surface correctly.

After completing this lesson, the student(s) will be able to clean and vacuum the interior correctly.

SECTION III Small Engine Repair

UNIT 1: Engine Principles

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify and discuss the four-cycle and the two-cycle engine components and demonstrate the ability to show the difference between engines.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to explain the difference in the external and internal combustion engines and the components of the small engines.

UNIT 2: Principles of Carburetion

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to explain the purpose and operation of the carburetion and fuel suystem, and service and repair the components correctly.

After completing this lesson, the students(s) will be able to service an air cleaner correctly.

After completing this lesson, the student(s) will be able to remove and replace a float type carburetor correctly.

After completing this lesson, the student(s) will be able to repair a leak in a steel fuel tank correctly.

After completing this lesson, the student(s) will be able to replace the diaphragm in a pulsa-jet carburetor with an automatic choke correctly.

After completing this lesson, the student(s) will be able to service the two-piece flo-jet carburetor correctly.

After completing this information sheet, the student(s) will be able to test and service the fuel pump correctly.

After completing this lesson, the s;tudent(s) will be able to service the sediment bowl fuel strainer correctly.

UNIT 3: Lubrication Systems

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system properly

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to explain purpose and components of the lubrication system and service with correct oils and lubricants.

After completing this lesson, the student(s) will be able to change the engine oil correctly.

After completing this lesson, the student(s) will be able to service the crankcase breather correctly.

UNIT 4: Starter Systems

UNIT OBJECTIVE:

After completing this unit, the student(s) will be able to remove and replace a starter and identify and discuss components of the starter system.

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to identify, remove, and service starters on small engines correctly.

After completing this lesson, the student(s) will be able to remove, service, and replace a DC starter correctly.

After completing this lesson, the student(s) will be able to remove, service and replace a starter rewind spring correctly.

After completing this lesson, the student(s) will be able to service and replace the vertical pull starter correctly.

UNIT 5: Measurement Instruments

UNIT OBJECTIVE:

After completing this unit, the student(s) will be able to use a micrometer, vernier caliper, dial indicator, telescoping gauge and other measuring instuments, and discuss the use of measuring instruments.

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to measure and give correct dimensions of machined parts, and identify parts of measuring instruments.

After completing this lesson, the student(s) will be able to use a vernier caliper correctly.

After completing this lesson, the student(s) will be able to use a plain micrometer correctly.

After completing this lesson, the student(s) will be able to use a dial indicator correctly.

After completing this lesson, the student(s) will be able to use a telescoping gauge correctly.

UNIT 6: Troubleshooting

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to define and discuss troubleshooting problems and how to repair them correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to define and describe how to troubleshoot and read a troubleshooting chart, and check the fuel, ignition and compression problems and repair them correctly.

After completing this lesson, the student(s) will be able to troubleshoot the fuel system correctly.

After completing this lesson, the student(s) will be able to troubleshoot the ignition system correctly.

After completing this lesson, the student(s) will be able to troubleshoot engine compression correctly.

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SECTION IV Welding

UNIT 1: Introduction to Oxyacetylene Welding

UNIT OBJECTIVE:

After completing this unit, the student(s) will be able to identify welding equipment and safety set up, light, adjust, and properly operate oxyacetylene welding equipment.

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to set up oxyacetylene equipment, light, and adjust the welding torch, form a puddle, and turn off the torch, and produce types of flames used in oxyacetylene welding.

After completing this lesson, the student(s) will be able to set up oxyacetylene equipment for welding correctly.

After completing this lesson, the student(s) will be able to turn on, light, and adjust the welding torch, form a weld puddle, and turn off the torch properly.

After completing this lesson, the student(s) will be able to adjust torch for welding correctly.

After completing this lesson, the student(s) will be able to make weld puddles with different torch settings correctly.

After completing this lesson, the student(s) will be able to lay a bead on a flat plate with no filler rod correctly.

After completing this lesson, the student(s) will be able to lay beads on flat plate with a filler rod correctly.

UNIT 2: Oxyacetylene Welding Positions and Applications

UNIT OBJECTIVE:

After completing this unit, the student(s) will be able to make and check the oxyacetylene welds for defects correctly.

SPECIFIC OBJECTIVE(S):

After completing this lesson, the student(s) will be able to determine tip sizes and rod selection, use oxyacetylene welding in all positions and understand the terms used in oxyacetylene welding.

After completing this lesson, the student(s) will be able to lay a flange weld without filler rod correctly.

After completing this lesson, the student(s) will be able to lay an outside corner weld without filler rod correctly.

After completing this lesson, the student(s) will be able to lay a flat butt weld with the proper size filler rod correctly.

After completing this lesson, the student(s) will be able to lay a lap weld with filler rod correctly.

After completing this lesson, the student(s) will be able to lay an inside corner weld with filler rod correctly.

After completing this lesson, the student(s) will be able to lay a butt joint without filler rod correctly.

After completing this lesson, the student(s) will be able to lay a back hand butt joint on heavy steel plate correctly.

After completing this lesson, the student(s) will be able to lay a beveled butt weld on a heavy steel plate correctly.

After completing this lesson, the student(s) will be able to backhand weld a beveled butt joint correctly.

After completing this lesson, the student(s) will be able to braze a butt joint correctly.

After completing this lesson, the student(s) will be able to braze weld a lap joint in the horizontal position correctly.

UNIT 3: Using the Cutting Torch

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to adjust, cut, and bevel with the oxyacetylene torch correctly.

After completing this lesson, the student(s) will be able to set up equipment for oxyacetylene cutting correctly.

After completing this lesson, the student(s) will be able to turn on, light, adjust, and turn off oxyacetylene cutting torch correctly.

After completing this lesson, the student(s) will be able to lay out lines on a piece of metal and cut with cutting torch at 90 degree angle correctly.

After completing this lesson, the student(s) will be able to cut a hole in a steel plate correctly.

After completing this lesson, the student(s) will be able to lay out a pattern on a steel plate and cut out the pattern to given specifications correctly.

After completing this lesson, the s;tudent(s) will be able to set up and cut a pipe bevel correctly by hand.

UNIT 4: Introduction to Shielded Metal Arc Welding

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to use welding equipment, make welds, and understand welding terminology and use correctly.

After completing this lesson, the student(s) will be able to build a pad on mild steel plate in the flat position with E7018 correctly.

After completing this lesson, the student(s) will be able to weld to specifications a fillet weld lap joint in the flat position with E6010 correctly.

After completing this lesson, the student(s) will be able to weld to specifications a fillet weld lap joint in the flat position with E7018 correctly.

After completing this lesson, the student(s) will be able to weld to specifications a fillet weld multi-pass tee joint in the flat position with E7018 correctly.

After completing this lesson, the student(s) will be able to weld to specifications a fillet weld lap joint in the flat position with E7024 correctly.

UNIT 5: Welding Joints and Positions

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will prepare and lay a V-butt arc weld, run a continuous bead without breaking an arc, and weld in the various welding positions correctly.

After completing this lesson, the student(s) will be able to run a stringer bead correctly.

After completing this lesson, the student(s) will be able to start, stop, and restart the bead correctly.

After completing this lesson, the student(s) will be able to make a pad in the flat position correctly.

After completing this lesson, the student(s) will be able to make a pad in a horizontal position correctly.

After completing this lesson, the student(s) will be able to make a pad in the vertical-up position correctly.

After completing this lesson, the student(s) will be able to make a V-butt weld correctly.

After completing this lesson, the student(s) will be able to make a single pass lap joint correctly.

After completing this lesson, the student(s) will be able to make a single pass fillet weld correctly.

After completing this lesson, the student(s) will be able to make a multiple pass fillet weld correctly.

After completing this lesson, the student(s) will be able to make a lap joint using the weave pattern correctly.

After completing this lesson, the student(s) will be able to make a fillet weld using the weave pattern correctly.

After completing this lesson, the student(s) will be able to lay a vertical-down stringer bead correctly.

UNIT 6: MIG Welding

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make metallic inert-gas (MIG) welded joints.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to identify terms used with MIG welding, identify and use types of filler wire and MIG weld correctly.

After completing this lesson, the student(s) will be able to make a MIG welding bead correctly.

After completing this lesson, the student(s) will be able to lay a single-pass butt weld correctly.

After completing this lesson, the student(s) will be able to lay a single-pass lap joint correctly.

After completing this lesson, the student(s) will be able to lay a tee weld joint correctly.

RESOURCES DEVELOPED FOR GENERAL MECHANICAL REPAIR

General Mechanical Repair Curriculum Guide, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-125-CG.

General Mechanical Repair Student Materials Manual, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-125-SM.

General Mechanical Repair Competency Test Packet, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-125-CTP.

General Mechanical Repair Lesson Plans, Educational Development and Training Center, East Texas State University, E. T. Station, Commerce, Texas 75429 Catalog # TI-125-LP.

APPENDIX

MODIFICATION TECHNIQUES FOR SPECIAL POPULATIONS

ACKNOWLEDGEMENT

The module 7 Overview of the *Vocational Special Needs Teacher Training Curriculum* has been reprinted with permission as this appendix. Teachers are encouraged to refer to the original publication to learn more about working with special needs populations. The character font size and line spacing have been changed in this appendix to save space.

The project was developed in 1987 by Craig R. Colby, Ed.D. of Texas A&M University. Linda H. Parrish, Ph.D., Texas A&M University, and Jerry L. Wircenski, Ph.D., North Texas State University, were the project directors.

The vocational special needs teacher training curriculum was developed pursuant to a contract with the Texas Education Agency's Vocational Education Special Projects. Contractors or grantees undertaking such projects under Agency sponsorship are encouraged to freely express their professional judgment in the conduct of the project. Opinions stated do not, therefore, necessarily present official Texas Education Agency position or policy.

This information is presented as an appendix to help Trade and Industrial teachers with planning the modification of instruction for special populations. Many of the concepts and ideas presented are sound practices to be used with normal populations.

The entire 10 module training curriculum is available through the University of Texas at Austin. The modules in the vocational special needs teacher training curriculum are as follows:

Module 1	How to Use the Modules
Module 2	Federal Legislation
Module 3	Learner Characteristics
Module 4	Vocational Assessment
Module 5	Coordinated Planning
Module 6	Interagency Cooperation
Module 7	Modifications
Module 8	Generalizable Skills
Module 9	Serving LEP Students
Module 10	Student Evaluations

CURRICULUM MODIFICATION

The term "vocational curriculum" can be defined as the organized content of a particular discipline which a student must master to attain an occupational goal. It involves the sum total of all experiences and learning activities encountered in the classroom. A curriculum is concerned with results. It encompasses "what is to be taught" and "what is to be learned" (Stern-Otazo, 1980; Goh & Sitlington, 1983).

As discussed in previous modules, each student has a mental capacity, physical skills, and various needs which vary from one individual to the other. In addition, students exhibit different learning styles. All good teachers recognize this and will work toward developing a classroom environment which is characterized by a deep respect for the learner, acceptance of student, fulfillment of individual needs, and individual development. This is what is meant by the teacher who has become "learner-centered" and not "content-centered" (Pine & Boy, 1977). Jones (1977) eloquently describes recognizing individual worth and individual development as being the basis for curriculum development as follows:

> **Individual development** as a basis for curriculum perspective would lead us to teach discovery of principles and sacredness of the individual personality. It would teach the learners to view themselves as self-actualizing individuals in a setting designed to support and encourage personal development to the ultimate of one's potential. Attempts to improve the local community would center around providing a richer and fuller life for personal growth and development. Good people make good communities, good states, good nations, and good world. By emphasizing development of individuals, such a curriculum would hope to plant the seed for a better world in the future.

Therefore, all learners should be perceived as very "special" individuals who one day will take their place in society. It is the responsibility of educators to assist **all** learners (in spite of their shortcomings) to become productive members of society. This can be accomplished by helping each student establish attainable career goals and then providing meaningful experiences through which the student can achieve these goals. Every student should be treated with dignity, as an individual who has unique strengths and interests in life. It is not necessary or even realistic to expect every student to do and know all the same things. As stated by Jones (1977), "Learners should become worthwhile persons in their own right,...it is not necessary that they all become miniature images of the same pattern."

Purpose of Curriculum Modification

When working with students with special needs, a learner's curriculum may need to be modified or adjusted to take into account major differences which could be found among these individuals. The term "curriculum modification" can be defined as tailoring an existing curriculum to the unique needs of students as they pursue an occupational goal (Sarkees & Scott, 1985; Goh & Sitlington, 1983). However, it should be strongly emphasized that modifying a curriculum does not mean that an educator should lower or alter the standards of his or her program. What it does mean is that the Admission Review and Dismissal (ARD) Committee (for handicapped students) or coordinated planning team (for disadvantaged and LEP students) determines which essential elements in the regular school curriculum would be appropriate for a student's needs. The State Board Of Education Rules For Curriculum offers the following key points (Texas Education Agency, 1985):

1. For students with special needs, school districts shall provide modifications in methodologies, pacing, and materials to ensure that instruction is delivered, as appropriate, in the essential elements.
2. Students with special needs shall be instructed in those same essential elements in a manner appropriate to their needs.
3. School districts shall implement the provisions (under Chapter 75) in a manner which will enable all students to participate actively in a well-balanced curriculum and master, to the best of their abilities, the knowledge, skills, and competencies established through the essential elements.
4. Specialized personnel and regular program personnel shall be jointly responsible for the cooperative delivery of effective instruction in the essential elements, as appropriate.

It is important to re-emphasize that special needs students, as all students, have capabilities which widely vary. The challenge parents, educators, and vocational counselors face is to help each learner reach occupational goals which are within the student's potential.

The Curriculum Modification Process

In developing a meaningful and challenging vocational curriculum, for a special needs learner, the ARD Committee or coordinated planning team should carefully review the student's vocational assessment information which consists of: (a) the student's capabilities, (b) parent and student interviews (including the career expectations of the learner), (c) the student's vocational interests and abilities, and (d) the teacher's informal behavioral assessments of the student.

After reviewing this information, the planning team can then work toward developing realistic and appropriate vocational goals for the student. Important items to consider when developing vocational goals include: (a) community employment needs, (b) vocational readiness skills, (c) multiple exit points (jobs that a learner can prepare for in the vocational program), and (d) entry-level competencies expected by employers for each of the exit points. In this way, the learner would be aware of realistic employment opportunities, specific skills needed for entry into a vocational program, and specific objectives which must be fulfilled in reaching an employment goal.

A number of special education curriculum models have been designed which take into account both the needs of a vocational program and the needs of the learner. The basic components which many of the designs have in common are as follows:

1. The importance of working with existing vocational curricula.

2. The importance of building upon the student's interests and competencies.
3. The identification of long range vocational goals and short range objectives—which are stated in measurable terms.

For the purpose of this overview, the competency-based curriculum modification model has been selected for discussion.

The Competency-Based Curriculum

Over the years, the concept of competency-based curriculum has increased in popularity largely due to the emphasis on accountability in education (Choate, et al., 1987). In addition, since the passage of P.L. 94-142, vocational educators have had to adjust their curricula to take into account the capabilities of special needs learners.

The underlaying principle behind the competency-based curriculum is to assist the student in becoming a more effective person. This entails helping the student develop skills or competencies which will promote employment opportunities and a higher self-esteem within the student (Brolin, 1976; Lippmann & Porter, 1976). The ability to succeed is what makes competency-based learning so valuable for students with special needs (Kok, 1978). With competency-based learning a student does not have to wait until the end of the program to experience success. The sequential steps called for throughout the program afford the possibility of success on a day-to-day basis (Lippmann & Porter, 1976).

The concept of competency-based learning is relatively simple. Based upon the learner's assessment information, the educator establishes specific goals (competencies) which will help the student "function adequately as a consumer, a producer, a learner, and a citizen" (Parnell, 1973). For example, in an auto mechanics class, the student's occupational program goals or competencies may include one or more of the following: (a) performing a simple lubrication, (b) repairing a tire, (c) changing the battery, (d) completing an engine tune-up, (e) completing a valve job, (f) fixing the carburetor, or (g) overhauling the engine. Next, the educator develops objectives and an individualized instructional plan for the student to follow. This individualized instructional plan includes: (a) an objective, (b) an introduction, (c) a learning activity, (d) a test/checklist, and (e) answers/feedbacks.

Therefore, in competency-based learning it is not necessary or even realistic for the instructor to expose every learner to all the aspects of a vocational program. Competency-based learning focuses on the quality of learning rather than the quantity of learning such that the student who has limited skills could still find employment (Kok, 1978).

Gill's Four-Step Model

An excellent competency-based paradigm or model which can be utilized by vocational educators to maximize a learner's vocational potential was developed by Douglas H. Gill (Sarkees & Scott, 1982). The design of Gill's model involves the use of four sequential steps and utilizes the regular vocational curriculum as a basis for the modification process.

Step one. The first step in Gill's model requires the educator to gain a clear picture of the existing curriculum any student would follow in a particular vocational program. Gill calls this step "Establishing the Curriculum Framework." The purpose of this step is to organize the existing curriculum in such a way that it can be modified. This step involves: (a) identifying the overall long-range goals of the vocational program, (b) identifying and listing the short-term objectives that sequentially comprise each long-range goal, and (c) identifying the instructional units which comprise a sequence for attaining each short-term objective. An example of a curriculum framework which outlines an overall long-range goal, short-term objective, and instructional units follows:

1. **Long range goal:** Given appropriate tools, equipment and materials, the student will be able to demonstrate instructor specified job entry level skills in the masonry area of construction trades at a comparable rate of time and accuracy to that found on the job.

2. **Short term objective:** The student will be able to demonstrate the basic skills of bricklaying.

3. **Instructional units:** Spreading mortar. Laying brick to a line. Building a brick corner. Cutting brick and block.

Once the long range goals, short term objectives, and instructional units have been outlined for a particular vocational program, the educator can begin the work of modification for a special needs learner.

Step two. Step two of Gill's four-step model, "Developing an Instructional Task Analysis," builds upon step one. The instructional task analysis lists the tasks that, when sequenced, make up the instructional unit. In this step the educator identifies the required tasks the student must perform, emphasizing what the student must do rather than what the student must read or write. An example of instructional tasks for one of the instructional units above follows:

1. **Instructional unit:** Spreading mortar.

2. **Instructional tasks:** Mix mortar.
   Identify and use trowel.
   Identify and use mortar board.
   Wet mortar board.
   Place mortar on board.
   Bunch mortar.
   Load trowel.
   Distribute mortar.
   Furrow mortar.
   Cut excess mortar.
   Seat mortar to trowel.
   Butter brick.
   Butter head joint.
   Lay one brick to another.
   Identify and explain purpose of running half-bond.

Therefore, establishing the curriculum framework and required instructional tasks (task analysis) organizes the instructional process and prepares for the next step in the process.

Step three. The third step in Gill's four-step model represents the implementation stage. This step, "Developing the Curriculum Supplement," involves developing usable supplements for the existing curriculum. The curriculum supplement is designed to be used jointly by the instructor and the resource support person. The curriculum supplement is composed of two major parts: (a) the Learning Plan and (b) the Supplemental Learning Plan.

The Learning Plan is used primarily by the instructor and consists of the following four basic parts:

1. Instructional unit
2. Instructional task
3. Performance-based task activities
4. Performance-based task check

The instructional unit and instructional task are components of the curriculum framework. The performance-based task activities describe for the instructor those task elements the student will do. The performance-based task check is a measurement of the student's ability to master the task at hand.

The Supplemental Learning Plan was developed for use primarily by special needs support personnel and consists of the following six basic parts:

1. Instructional Unit
2. Instructional task
3. Task terminology
4. Essential math operations
5. Coordinated movements
6. Related concepts

The purpose of the Supplemental Learning Plan is to identify basic knowledge (task terminology, essential math operations, important concepts) and prerequisite skills (coordinated movements, related concepts) the learner must posses in order to complete an instructional task. The Supplemental Learning Plan can be very useful in helping the resource teacher and instructor identify those areas where instruction support may be needed. It is, therefore, very important that the Learning Plan and Supplemental Learning Plan be developed by the instructor, special education teacher, or support/resource teacher for each instructional task. In this way, if a learner has difficulty mastering a specific task, individualized activities can be developed by selected individuals to help the student resolve the problem.

Step four. The fourth and final step of Gill's model is the development of an individualized student module. The student's module is created from the Learning Plan and Supplemental Learning Plan and is the culmination of the curriculum modification process. The student's module consists of the following four components (Goh & Sitlington, 1983):

1. **Word section:** Includes terms identified on the supplemental learning plan, along with definitions of each term.
2. **Job tasks:** Definition of each step in the job. This appears in the student module under the heading "What You Do."
3. **Illustrations of job tasks:** The illustrations help clarify the job steps and should be clear and precise, without being complex.
4. **Evaluation procedures:** Both enroute (formative) checkups and a final (summative) performance check are included to assess the learner's progress through the module.

The student's module is tailored to help meet the specific needs of a learner and serves as a guide to assist the student in achieving instructional tasks. Various ways in which a student's module can be individualized to take into account the various learner differences found in the training setting are as follows (Goh & Sitlington, 1983):

1. The amount of detail and illustrations can be varied to take into account learner differences in intellectual abilities and educational backgrounds.
2. The mode of presentation can be altered to meet the needs of learners with differences in learning styles (e.g. audio-cassettes can be added for auditory learners).
3. The amount of feedback from the module and instructor can be increased or decreased to match differences in motivation, perseverance, and tolerance levels.

In summary, Gill's four-step model is a competency-based process flowing directly from the regular vocational curriculum. The steps range from establishing a curriculum framework to developing an individualized student module. Gill's model is not designed to replace or lower the standards of the regular vocational curriculum. It is a systematic process by which a special needs student can achieve solid vocational goals through the cooperative support of vocational instructors, special educators, and support personnel.

Responsibilities of the Vocational Educator

The primary responsibility of the vocational educator in the curriculum modification process is to help the special needs student establish and reach realistic occupational goals. In an effort to accomplish this, the vocational educator must identify the following (Sarkees & Scott, 1985):

1. Pertinent information about what will be taught in a vocational program.
2. Necessary requirements for program completion.
3. Multiple exit points (jobs that the learner can prepare for in a vocational program).
4. Entry level competencies expected by employers for each of the exit points.

It is also the responsibility of every vocational educator to establish an effective and wholesome learning environment for their students. Providing this environment may involve modifying the vocational facility, equipment, tools and/or instruction. This information will be provided in the following section.

MODIFICATION OF THE LEARNING ENVIRONMENT

The term "learning environment" refers to both the physical and instructional setting of the vocational classroom/laboratory (Bell, 1984). It is the responsibility of each vocational educator to work at developing a learning environment which will contribute to the overall well-being and success of every student. The key factors found in wholesome learning environment are those which promote:

1. **Safety, organization, and physical comfort.** In the vocational laboratory, it is absolutely crucial that each student abide by safety rules set by the instructor. In addition, the laboratory should be kept well organized and clean. A laboratory which is safe, well organized, and physically comfortable helps promote high morale and good work habits.

2. **Respect and acceptance.** Within an effective learning environment, students will show respect not only for the instructor but for each other as well. The instructor should be the student's best role model. The care and acceptance given by the instructor to each student (disabled or non-disabled) will go a long way in promoting peer acceptance, a positive attitude, and healthy self-esteem.

3. **Discipline.** A wholesome learning environment is one which promotes discipline and a positive self-concept within each student. Inappropriate behavior has the potential to seriously affect classroom safety, morale, and the overall learning process. Ways in which the instructor can help the student modify inappropriate behavior include: (a) utilizing the time-out technique, (b) developing student-teacher contracts, (c) ignoring negative behavior—whenever possible, and (d) rewarding appropriate behavior with approval and praise.

4. **Flexibility.** An effective learning environment is flexible and can adapt to a special student's unique needs (i.e., slower rate of learning, inability to access regular tools/equipment, or remedial needs in reading or math for instance). A flexible environment fosters individualized programs through which a special learner can develop marketable skills for employment.

Modifying Facilities, Equipment, and Tools

In the past, many special needs learners have been denied their basic right to a public education because of architectural barriers, nonadaptive facilities, equipment, and tools (Phelps & Lutz, 1977). However, federal legislation has done a great deal to provide equal access to educational programs for every learner. For example, according to Section 503 of the Rehabilitation Act of 1973, each federally funded program or activity in which a handicapped individual can enroll and profit must be made accessible to the student (Sarkees & Scott, 1985). In addition, the Carl Perkins Act of 1984 has emphasized the importance of providing supplemental services for special needs learners, which include the adaptation of facilities, equipment, curriculum, and instruction (Cobb & Kingbury, 1985).

Modifying facilities. A barrier-free facility planned for safety, efficiency, and convenience is of vital importance to individuals with special needs—especially those who are in wheelchairs, on crutches, or have artificial limbs. According to Sarkees & Scott (1985), three major areas in which architectural barriers may be present at most vocational education facilities are:

1. **Getting to and entering the building** — getting to the ground from public or private transportation; parking; negotiating parking lot pavement, curbs, walkways, ramps, and stairways; and entering exterior doors.
2. **Moving about inside a building** — moving through corridors and hallways; moving from floor to floor; identifying and entering classrooms, laboratories, and auxiliary areas; moving through aisles and traffic lanes inside classrooms and laboratories.
3. **Using school fixtures, appliances, and study/work station area equipment** — using restrooms, drinking fountains, vending machines, tools, machines, and work station apparatus.

In an effort to eliminate these barriers, vocational educators, planners, and administrators should contact the State Architectural Barriers Board or State Department of Education regarding the guidelines and standards that have been developed for compliance with federal mandates. The federal government has adopted the American National Standards Institute (ANSI) accessibility standards as its mandatory guidelines for removal of architectural barriers (Sarkees & Scott, 1985).

Modifying equipment and tools. Based upon the needs of each special learner, it may become necessary to modify existing equipment and tools to accommodate the special needs student. The degree of modification will depend upon the type and extent of each student's impairment. It should be remembered, however, that equipment should be modified only to the extent necessary to assist the student. Whenever possible, as the student generates competence in a learning task, the modified equipment should be replaced with regular equipment (Phelps & Lutz, 1977). The following are some general suggestions in which equipment and tools can be modified for specific classifications of special needs students (Phelps & Lutz, 1977; Sarkees & Scott, 1985; Stern & Gathercoal, 1986):

Important Note: It is very possible that a number of these suggestions could apply to more than one category.
Furthermore, some of these modifications may be applicable to disadvantaged and LEP students. This, of course, would depend upon the needs of the particular student.

Modifications for Orthopedically-Impaired Students

1. Work benches can be cut out so that wheelchair bound students can pull up close to the work surface.
2. Modify the height of workbenches, storage cabinets, table tops, etc. to make them accessible to wheelchair bound students.

3. A lap board can be fitted on the arms of the wheelchair to provide a work area.
4. Rearrange storage areas for tools and supplies to make them accessible and as near to the work station as possible.
5. Position bench-mounted power tools on the ends of benches.
6. Semistationary equipment should be put on variable height bases.
7. Modify machine controls so that they can be operated with prostheses such as an arm hook.
8. Replace cabinet knobs with levers or handles.
9. Convert knob-type ON-OFF switches to toggle switches, levers, or slide-adjustment mechanisms.
10. Provide an aid that increases mechanical advantage in manipulating controls.
11. Convert machines and equipment that have hand controls to the foot pedal type for students who have upper extremity disabilities.
12. Select machines that do not require two-handed operation, such as a radial arm saw instead of a table saw.
13. Place small parts of instruments on a foam pad to aid students in picking them up.
14. Select tools that require only one hand to operate, such as split screwdrivers, which hold screws and bolts for starting.
15. Provide holding devises such as vacuum vises, stationary vises, clamps, jibs, and fixtures that permit one-handed operation.
16. Provide tools that supply more mechanical advantage to loosen or tighten screws or bolts, such as a lever-type socket set or an offset screwdriver.
17. For students who have weak hands, increase the size of tool handles by replacing them with larger diameter handles or by enlarging them with tubing or tape wrappings.
18. Provide templates to aid drafting students who have trouble manipulating standard drafting instruments.

Modifications for Hearing-Impaired Students

1. Install a red light next to the on-off switch so that the student can tell when the machine is in operation.
2. Install amplification devices on auditory warning signals so that they can be heard by those with partial hearing.

3. Use visual timers in place of those that emit sounds.

Modifications for Visually-Impaired Students

1. Purchase commercially available measuring tools with raised or engraved markings that can be read by touch.
2. Purchase measuring devices that provide auditory signals.
3. Brailled tape or raised marks can be used on control dials and switches.
4. Enlarge markings on tools, tool holders, or machine controls.
5. Provide jigs, guides, and templates to aid students in positioning and guiding tools.
6. Identify controls by changing their size, shape, or texture.

Modifications for Mentally-Impaired Students.

1. Color code important parts of machines or equipment.
2. Devise jigs, fixtures, templates, and guides to simplify work task operations.

Modifications for Limited English Proficient Students

1. Utilize name placards (Spanish and English) for machines, tools, and equipment.
2. Color code or use symbols for dangerous machines. For example, one red dot could indicate a dangerous machine and two red dots could indicate a very dangerous machine.

A wide variety of specially designed aids, tools, machines, and equipment are commercially available to assist the special needs learner. Occasionally, this material can be paid for through vocational rehabilitation centers or the school's special education program. Information pertaining to manufactured devices can be found in school supply catalogs or in catalogs published by special institutes. A very comprehensive resource has been developed by the Wisconsin Studies Center, University of Wisconsin-Madison, entitled Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People. In addition, information is available through the school's special education personnel and vocational rehabilitation counselors (Sarkees & Scott, 1985).

In conclusion, two educational topics have been presented which are **fundamental components** to the successful instruction of learners with special needs: (a) developing or tailoring an appropriate curriculum and (b) establishing a favorable learning environment. Within the final section of this overview, basic principles will be presented which will address the actual instruction of special learners.

MODIFICATION OF INSTRUCTION

The primary purpose of this section is to provide the vocational educator with teaching strategies and techniques that will be useful when instructing students with special needs. It is important to remember that the methods and approaches used by educators when instructing non-special needs students may not be very effective with students with special needs (Gleiss-Monar & Sitlington, 1983). Therefore, individualizing instruction becomes vitally important in the successful instruction of special learners.

Within this section, the following topics will be discussed: (a) learning styles, (b) teaching strategies, (c) remediation techniques, and (d) Brown's 3-Cs Instructional Mode.

Learning Styles

Each special learner has unique needs and these needs affect how the student can best learn. For example, if a student is blind or has difficulty with "visual" learning, the instructor should stress the learner's sense of sight. Therefore, the manner in which a student with special needs learns ceases to be a preference, but becomes instead a necessity (Kok, Jernigan, & Hull, 1978). Further, one of the main philosophies behind individual learning styles is that learning should be a pleasant and successful experience. Educators, therefore, should adjust their style of teaching to allow students the benefit of learning in their preferred manner (Kok, Jernigan, & Hull, 1978).

Identifying a student's learning style.

The following are methods in which an educator can identify a student's learning style:

1. **Informal observation.** One of the simplest and possibly best ways to identify a student's learning style is through informal observation. By observing the student as he or she negotiates classroom/laboratory learning activities, the educator can collect valuable information with regard to the student's learning style. For example, the educator may observe that a disadvantaged student answers questions in class and does well with hands-on activities but repeatedly fails written exams. If the primary intent of the instruction is to reach vocational skills rather than reading and writing skills, the instructor could modify their style of teaching by allowing the student to take oral and/or hands-on exams (Kok, Jernigan, & Hull, 1978: Sarkees & Scott, 1985).

2. **Teacher consultation.** Consulting other teachers (i.e., special education teachers, resource room teachers, support personnel, paraprofessionals, and other vocational education teachers) can be an excellent source for information regarding a student's learning style (Sarkees & Scott, 1985).

3. **Student/parent interviews.** Interviewing the student and student's parents/guardians can result in valuable insights as to the student's best learning modes (Sarkees & Scott, 1985)

4. **Standardized inventories.** Standardized inventories provide an alternative for students who are shy or uncomfortable during a personal interview. Information

received from interest, personality, and learning style inventories can provide valuable information with regard to the student's learning style (Kok, Jernigan, & Hull, 1978; Sarkees & Scott, 1985).

Teaching Strategies

Once the student's vocational goals, learning capability, and preferred learning style have been identified, the educator can begin to experiment with a variety of teaching techniques and instructional materials. When determining the teaching technique and instructional material best suited to meet a student's unique needs, it is important for the educator to be patient, open-minded, and flexible. Not every instructional technique and/or material can be used successfully with each learner (Sarkees & Scott, 1985). In addition, the educator should not hesitate to enlist the support of other instructors, school counselors, student aides, paraprofessionals, volunteers from the community, itinerant teachers, and/or interpreters. This pooling of efforts can result in increased student learning because of the variety of approaches and personal attention which can be brought to the classroom or laboratory (Harrington & Fardig, 1982).

The following are general guidelines and instructional techniques which an educator can use to help meet a special needs learner's unique needs and learning style:

1. **Orientation**. Students with special needs may need additional orientation with regard to: (a) the relevancy of their individualized goals, (b) class procedures, (c) safety, etc.

2. **Flexible pacing**. Students with special needs can exhibit different rates of learning. The educator should provide flexibility in pacing of instruction and assignments to meet the various needs of learners. In general, students with special needs should be individually paced to maintain their progress and interest, yet avoid the frustrations and failure undue pressure may cause (Harrington & Fardig, 1982; Sarkees & Scott, 1985).

3. **Demonstration**. Utilization of the demonstration method can be very effective in introducing a new skill to a learner with special needs.

4. **Breaking material into small distinct steps**. As a general rule, it is important for the educator to break a learning concept into small distinct steps. In this way, the educator can best identify where the student is experiencing difficulty.

5. **Positive environment and feedback**. In general, students with special needs lack confidence and a positive self-concept. This is primarily due to their not having had much success in life. In addition, the few successes special learners do have usually result in little, if any, positive reinforcement (i.e., praise, reward, and/or encouragement). Therefore, it is incumbent upon educators to create a positive, nonthreatening learning environment for their students and to make generous use of positive feedback when the student experiences success. Constructive criticism should not be avoided; however, it should be given in a positive manner (i.e, students should understand that their behavior or product is what's being criticized and not their worth as a human being). Finally, all students must learn

that mistakes and constructive criticism are a normal and expected part of life (Harrington & Fardig, 1982).

6. **Use of peer tutors, college students, and volunteers.** Use of peer tutors, college students, and volunteers can greatly assist a vocational educator's work with special learners by: (a) helping with individualized instruction, (b) providing positive role models, (c) increasing student participation, (d) increasing the special learner's success experiences, (e) increasing the student's confidence and self-esteem, and (f) improving the special learner's social and academic skills (Asselin & Anderson, 1986). In addition, peer tutors, college students, and volunteers can receive teaching experience and the satisfaction of helping individuals with special needs progress.

7. **Flexible grouping.** The educator can integrate special needs learners into groups of various sizes (according to the student's goals, interests, or ability level) and utilize peer tutors, college students, and volunteers for assistance. According to Sarkees & Scott, grouping students has the following advantages: (a) it allows the teacher more time to work among the students, (b) it allows the teacher to individualize instruction, tasks, and assignments to meet the needs of students in a specific group, (c) it provides special needs learners with an opportunity to work with peers and establish positive interpersonal and working relationships with them, (d) it serves as a motivating factor for special needs learners because the individualized nature of the group work does not become threatening or frustrating but allows students an opportunity to work at their own pace through their strongest learning style, (e) it allows teachers to arrange for instruction for the entire class, small group discussions, project groups, and small remedial sessions so that instruction will be diversified and more meaningful for all students; and (f) it allows the teacher to modify the task or assignment for a small group of students with specific needs, as in the case of learners who have a physical disability (Sarkees & Scott, 1985).

8. **Providing field trips and job site visits.** Scheduled field trips and job site visits can give all learners a realistic first-hand look into the real world of work. By "shadowing" workers in a particular occupational area, students can gain helpful insights into their own career decision. In addition, a field trip or job site visit can be very motivational in that the student can readily observe how his/her vocational training will be used in the world of work (Sarkees & Scott, 1985).

9. **Use of media.** Utilizing media can embellish instruction by: (A) assisting the teacher in presenting the proficiency or skill requirements for a specific job, (b) reinforcing concepts presented in a classroom, laboratory, or demonstration activity, (c) providing a vehicle for special needs learners to show what they have learned, (d) providing a valuable source of remedial assistance, (e) providing simulated learning experiences, (g) allowing special needs students to learn through their strongest style, and (h) adding variety to the instructional program. Examples of media include: computer assisted instruction (CAI), 16 mm films, film strips, flip charts, overhead transparencies, tape recorders, records, posters, magazines, and diagrams (Sarkees & Scott, 1985).

10. **Use of student-teacher contracts.** Student-teacher contracts can be excellent tools in helping learners with special needs achieve their vocational goals. The following guidelines should be used in developing and implementing a student-teacher contract: (a) decide on the task or project, (b) specifically state the requirements, (c) determine the minimum acceptable accuracy, (d) set a time limit—initially, short assignments and short time periods are usually best, (e) identify consequences, (f) discuss contract with student and support personnel, (g) have all parties sign the contract, (h) positive reinforcement should be given if the terms of the contract are satisfactorily met, (i) uncompleted contracts should be analyzed by the teacher and student to determine the causes, and (j) develop new contracts cooperatively (Sarkees & Scott, 1985).

The following is a list of specific teaching strategies which educators can utilize when addressing the unique needs of handicapped students (Sarkees & Scott, 1985; Stern & Gathercoal, 1986: Tindall, 1980):

Important Note: It is very important to note that many of these teaching strategies could be used for all students. Appearing later in this overview is a listing of instructional strategies which could be generic to all special needs students.

Instructing Students Who Are Mentally-Impaired

Involve as many different senses as possible in the learning process.

Use concrete specific terms rather than abstract terms. If necessary, have the student repeat the necessary information to you.

When giving written directions use lists instead of paragraphs. With regard to the student who can barely read, contact the remedial reading staff and arrange reading instruction. This instruction should focus on required reading for your course and that which is vital for employment.

Teach by demonstration (whenever possible). Don't hesitate to use hand-over-hand assistance in demonstrating how to use a tool or machine.

Allow time to practice machine or tool processes.

Break down complex operations into smaller tasks.

With regard to feedback, let the learner know what is wanted, and whether or not the student is achieving it. Give lots of positive reinforcement and encouragement. Nonverbal feedback is also helpful (i.e. touching the student or task, pointing, blocking or stopping an error as it is developing, and guiding the learner's movements. In addition, provide specific feedback with regard to the student's work. For example, the educator should say, "This piece was cut exactly to the right size," or "You put these two parts together correctly, " or use Mark Gold's expression "Try another way" (Gold, 1975).

Build the student's confidence by: (a) utilizing activities that will assure success, (b) assigning special tasks which will communicate with the educator's confidence in the student, (c) giving students an opportunity to correct their work and hand in a good project or assignment, and (d) displaying the student's good work.

In helping students with their ability to make correct discriminations, utilize Gold's "match to sample" technique in which the student is provided an example and a number of choices. The student will choose the correct alternative based upon the characteristics of the sample (Gold & Scott, 1971).

With regard to helping the student make correct discriminations when there are minimal differences between the stimuli, it may be necessary to: (a) present the choices in an easy form at first, (b) exaggerate attributes, (c) make the choices gradually harder, or (d) add and fade out color cue, add and then gradually remove large cue differences, or combine these two approaches.

Retention/memory can be improved by: (a) being systematic and presenting one new piece of learning at a time, (b) relating new material to familiar material, and keeping it practical and concrete, and (c) utilizing training techniques such as the total task method, chaining, modeling/demonstrating, and the structured overview (see Tindalls' Puzzled About Educating Special Needs Students).

"Generalizing", or having the student apply what has been learned to the contexts, can be improved by: (a) using examples from different relevant contexts and (b) practicing in settings similar to or exactly like those that will be encountered on the job.

Instructing Students Who Are Hearing-Impaired

In private, discuss with the student his/her ability to communicate with you (lip/speech reading, use of hearing aid, writing, signing, and total communication). An open discussion with the student which demonstrates your concern as an educator is an excellent beginning in building rapport.

Body language communicates messages too. Remember not to give mixed messages with your body language. Also, be alert to the body message the student is giving you (i.e., is he/she communicating tension, nervousness, avoidance, or confusion?)

If you will be working with an interpreter, do not instruct the deaf student as if he/she were a third party. Speak directly to the student. Also, remember that the interpreter is ethically bound to interpret everything you say. Therefore, sensitive or other issues concerning the student is best addressed in a meeting before or after class. If you are using media where the room must be darkened, focus a small lamp on the interpreter.

Maintain good eye contact with the student while speaking.

Speak slowly and clearly, pronouncing each word, but without exaggerating or over pronouncing.

Do not stand in front of a window while speaking. The light should be shining on your face and not the student's.

Try to rephrase a thought rather than saying the same words over again.

Encourage the student to read ahead on class material.

Try to keep the noise level down as much as possible in the class/laboratory.

Utilize handouts, the chalkboard, and other media.

Install a light to indicate when dangerous machinery is on.

Instructing Students Who Are Speech-Impaired

Always maintain eye contact and nod your head while the student is talking. This will help the student build confidence.

Work cooperatively with speech therapist and/or communication specialist to determine which technique will help most in assisting these students to communicate more effectively.

Encourage peer tutoring and small group activities to help the speech-impaired student develop interpersonal relationships with the other students.

Always allow sufficient time for the student to complete his/her sentence.

Try not to act uncomfortable when these individuals are communicating with you (i.e., discontinuing eye contact, shifting your position, clearing your throat). Your discomfort can be very discouraging to the student.

Do not require these individuals to present oral reports until they feel comfortable in the classroom environment.

Model correct sentence structure for the speech-impaired student so he/she can follow your example.

Develop a list of technical terms used in your class and share these terms with the speech specialist to help the student become more confident in pronouncing terms used in class.

Instructing Students Who are Visually Impaired

Orient the student to the classroom or laboratory before the course begins. Consistency and orderliness in the physical environment is very important to the visually-impaired student.

Arrange seating so the blind student will be able to hear the instruction and allow for the best distance and lighting conditions for the partially sighted student.

Provide as many opportunities as possible for the visually impaired student to observe closely or to touch the materials.

Give materials and handouts to the student ahead of time. Also, a student peer can assist visually-impaired student by making a carbon copy or a photocopy of their notes. Also, when possible, the educator can make a copy of their teaching notes. In this way the visually-impaired student can make a copy of their teaching notes. The visually-impaired student can review the materials with a tutor or have them transcribed into braille or taped.

It is important to gain and maintain the student's attention. Approval or disapproval will need to be verbalized.

Remember there is no need to talk louder to a visually-impaired student.

Rehabilitation counselors or special needs teachers can be useful resources in helping the student use commercial or modified learning aids or tools.

Tests may need to be prepared in large print, braille, on cassette tapes, or converted into exercises using the sense of touch. Also, it may be necessary to allow the student extra time to complete the test.

The tape recorder is the most frequently used technique for notetaking and preparing modified learning materials for the visually-impaired student.

The following is a sample of specially designed machines now available for the visually-impaired student: (a) OPTACON (Optical to Tacile Converter) allows students to read printed material, (b) STEREO-TONER is similar to the OPTACON but converts the printed word into a tone pattern, (c) OPTOPHONE and VISOTACTOR convert print into sound, and (d) KURZWEL READING MACHINE which converts standard English text on a computer into easily comprehended speech.

A number of general tools or aids which can assist the student in reading or writing lessons for vocational courses follow: (a) braille, (b) large print, (c) tape recorders, (d) talking books, (e) raised letters, (f) slate and stylus (used to make notes), (g) braille writer (a 6-key manually operated machine), (h) typewriters, (i) braille verifier (types braille and regular copy simultaneously), and (j) signature guides.

Aids for mathematics and computer programming courses follow: (a) abacus design for the blind, (b) raised clock faces, (c) wire geometrical forms, (d) braille rulers, (e) raised-line checkbooks, (f) raised-line boards, (g) braille dominoes, (h) braille flash cards, (i) cubes with raised braille dots used for simple mathematical problems, (j) raised-line paper or graphs, (k) computer terminals that use braille printers, or those that type braille and conventional type simultaneously, and (l) talking calculators.

Aids used frequently in other vocational courses include: (a) braille maps, charts, diagrams, (b) self-threading needles, (c) wooden or cardboard models of specimens that other students see through microscopes, (d) braille micrometers and other shop tools that have special raised markings, (e) braille demo tapes to mark lab equipment and models, (f) light probes with adible sounds that check the operating status of machines, and (g) guides or templates to help students align objects properly.

Instructing Students Who Are Seriously Emotionally Disturbed

Consult with the student's parents, special education teacher, or counselor to determine whether any particular teaching techniques will help or hinder learning.

Try to understand the student. Disturbing behaviors are the outward sign of inner turmoil.

Go easy on bad days and avoid direct confrontations that would aggravate the situation.

Communicate acceptance to the student and a willingness to help him or her succeed in class.

Provide immediate feedback and reinforcement.

Establishing a rapport and trust with the student is important.

In the beginning of the semester, help the student gain confidence by giving him or her lessons in which success can be achieved in a series of small steps.

A measure of privacy when the student attempts a new task can ease his or her embarrassment at any awkwardness or ineptness.

Allow the student to correct mistakes prior to turning in an assignment or project to ease any pressure.

Help the student not to overreact to failure and praise him or her for continuing to try.

Cue appropriate behavior in a quiet, unemotional manner.

In resolving discipline problems: (a) do so in privacy, (b) focus on objective facts in a calm, supportive tone, (c) actively listen to the student, (d) after listening to the student, reflect on what has been said, by telling the student what you've heard, (e) ask the student if he or she has any ideas about solving the problem (encourage the student to be specific), and (f) conclude with a clear understanding of the changes, time-frame, and benefits which are expected.

In handling aggressive behavior: (a) try to remain calm and model the controlled behavior which you desire, (b) intervene by either separating the individuals involved and having them work on another activity or having them take a time-out in separate corners of the room, (c) if necessary, send an uninvolved student to the office to get help, either in talking to the students or in managing the class while the teacher talks to them, and (d) return to normal classroom procedure as quickly as possible.

Access professional colleagues in special education evaluation, counseling, or therapy when the student's behavior appears to be in need of additional attention.

Instructing Students Who Are Orthopedically Impaired

In general, students with physical handicaps will be intellectually capable and able to participate in vocational programs.

Make the necessary modifications in classrooms, laboratories, equipment, building accessibility, and lavatories.

For notetaking the student can: (a) use a tape recorder, (b) have a classmate slip a carbon copy into his/her notebook to duplicate notes, and/or (c) have the instructor prepare an outline of the lecture.

For exams the instructor can: (a) give oral exams, (b) have the student dictate answers into a tape recorder or to another student, or (c) utilize a typewriter/computer if the student is able to type/keyboard.

Give the student more time to complete homework assignments. Also, giving the student advance notification of assignments is helpful.

In the laboratory, pair the student with one or more capable students in the class.

Enlarged copies of frequently used charts and diagrams posted near the student's desk eliminates the necessity of paging through a book.

Instructing Students Who Are Otherwise Health Impaired

Allow the students sufficient time for rest.

Seat the student in the most convenient place for easy access to necessary facilities (hall, lavatory, chalkboard, laboratory work stations).

Allow the students to work on program requirements at his or her own pace.

Tape lectures so the student can listen to them at home.

Work cooperatively with the health team to learn more about the student's special needs.

Utilize community resources personnel (social workers and itinerant teachers for homebound students) for delivery of materials, assignments, and handouts.

Instructing Students Who Have Specific Learning Disabilities

Use visuals and demonstrations as often as possible.

Use concrete examples whenever possible.

Provide student with an outline of what will be covered in class.

Make sure all printed materials are clear and readable.

If the student has a visual perception problem, allow him or her to tape-record assignments.

Allow students to take tests orally or in a mode that compliments their performance.

Present new information in small amounts.

Make sure that writing assignments are relevant to the content of the program.

Allow students a longer period of time to complete assignments, if necessary.

List assignments in steps.

Task analysis can be used to lower the frustration level of these learners.

Programmed instruction materials can be very effective with these learners.

The following is a list of specific teaching strategies which can be very useful when working with students who have **limited English proficiency** (Sarkees & Scott, 1985):

Recognize the student's cultural background and allow for the student's individual differences.

Encourage these students to bring dictionaries to class.

Use demonstrations and hands-on experience as much as possible.

Speak slowly and use simple vocabulary and grammar.

Use bright felt tip markers to mark important words, passages, or illustrations.

If possible, use a translator for important concepts.

Work closely with LEP support personnel.

Keep homework assignments short.

Check for comprehension by asking the student what you have said.

Use simple sentences when writing test items so the student can concentrate on answering the question rather than deciphering it.

And finally, with regard to the disadvantaged population, typically these individuals dislike school, lack motivation, and have a low self-concept or esteem. Therefore, an educator's personal commitment and high expectations for the student may be two of the biggest single factors which will make a positive difference in this individual's life. Additionally, an educator's good example (i.e., being patient, understanding, well organized, and a good manager) can be extremely valuable in motivating and positively shaping the student's behavior (Baca, 1981). Vocational education can offer a great deal to the disadvantaged student in terms of teaching academic and social skills relative to the student's potential employment (Baca, 1981). The following are additional techniques or teaching strategies which can be very useful when working with disadvantaged students (Baca, 1981):

The educator should seek to understand the student's educational and social background through: (a) assessment information, (b) interaction with former teachers, (c) discussions with counselors, and (d) visits with parents to ascertain the student's social limitations and home situation.

Basic math, communication, and social skills should be reinforced. Math skills can be reinforced through hands-on learning activities. Communication skills can be improved by tactfully correcting poor grammar, when appropriate, and by providing resources that encourage reading in job related interests. Social skills such as getting along with people, grooming, proper dress, and respect for property and authority should be reinforced on a continual basis.

The importance of finishing school should be continually stressed. Relate acquisition of job skills to earn income.

Reinforce the student's feelings of self-worth by having high expectations for the student and by providing immediate reinforcement for work done well.

Simulate realistic job situations. All classroom and laboratory experiences should relate to employment in the occupation being studied.

Disadvantaged students (as all students) will typically react to the learning environment in a responsible and mature manner when they are treated with respect and as adults by the educator.

Classroom organization and discipline (being firm but not overbearing) are especially important. Generally, disadvantaged students want and need structure and discipline within their lives. Usually, these individuals will be responsive to and respect teachers who are firm, but sensitive.

Help the student develop employability and job coping skills (i.e., skills associated with finding, applying for, and retaining a job).

Help the student establish good work habits by keeping him or her involved with meaningful learning experiences. Each activity should have concrete learning objectives.

Disadvantaged students may need more encouragement to stay on task; however, they still should be required to complete all assignments (just as they will be required to do on the job).

Present instructions and information in clear, logical steps—building from the simple to the complex.

Technical terms should be communicated clearly and concisely and written in language which the students will understand.

Incorporate a variety of instructional methods in the curriculum (i.e., demonstrations, resource personnel, field trips, peer tutors, role playing, audio-visual aids, and on-site work experiences).

Present supplemental materials when appropriate. If such material is relevant to the acquisition of job skills, the student will not be humiliated by simplified material.

Highlight important parts of the student's text with a light marker to prevent the student from feeling overwhelmed with a larger volume of reading material.

Progress charts can be utilized to motivate disadvantaged students to master new skills.

Utilize flash cards (teacher made or commercial) to reinforce new terms and the use of tools and equipment.

When teaching special needs students, it is very important that instructors do not limit their instructional techniques. Therefore, the following abstract of instructional techniques or strategies has been prepared which could be considered generic to all special needs populations.

Involve as many different senses as possible

Use concrete terms

Have students repeat important information

Use lists rather than paragraphs for written directions

Teach by demonstration

Use hand-over-hand assistance when necessary

Allow practice time

Break complex operations into smaller tasks

Provide immediate feedback

Build confidence

Help student make correct discriminations

Help student with their retention/memory

Help student generalize knowledge

Build rapport

Use appropriate body language

Use appropriate techniques when working with an interpreter

Maintain good eye contact

Speak slowly and clearly

Rephrase thoughts when necessary

Encourage the student to read ahead

Keep the noise level down

Utilize various forms of media

Use lights to indicate when dangerous machinery is on

Work cooperatively with therapists

Encourage peer tutoring

Try not to act uncomfortable around special needs students

Help students feel comfortable

Model correct sentence structure

Develop a list of technical terms for students and/or therapists

Orient students before the course begins

Provide handouts ahead of time

Maintain student's attention

Use tape recorders for note taking

Try to understand the student

Communicate acceptance

Develop success experiences for the student

Use appropriate behavioral management techniques

Facilitate the students with their notetaking

Facilitate the students with exams

Pair students

Enlarge charts and diagrams

Use clear, readable visuals frequently

Provide an outline of material which is being taught

Writing assignments should be relevant

Use task analysis when necessary

Allow for individual differences

Encourage students to bring a dictionary

Use felt tip marker to highlight important parts

Do not make homework assignments too lengthy

Use simple sentences when writing test items

Reinforce basic education and work skills

Reinforce the importance of finishing school

Reinforce the student's feelings of self-worth

Simulate realistic job situations

Treat all students with respect and dignity

Provide structure and organization

Utilize progress charts

Utilize flash cards

Remediation in the Basic Education Skills

It is very important to note that some students may need to acquire one or more basic education skills (i.e., mathematics, reading, writing, speaking, listening, interpersonal relations, and/or reasoning skills) to succeed in vocational program. In addition, many employers will not hire an individual if he or she lacks these skills. Therefore, instruction in basic education skills may be necessary by the vocational educator. For information concerning basic or generalized skills instruction see Module 8.

Brown's 3-C Model

Brown's 3-C Model helps tie together many of the educational aspects discussed in this overview. In general, Brown suggests that when delivering instruction to learners with special needs, the instructor can enhance the student's success rate and reduce feelings of frustration by considering the following 3-Cs of instruction: (a) correction, (b) compensation, and (c) circumvention (Brown & Dayser, 1982):

Correction. Providing feedback when the student's skills are being developed, thereby, correcting inappropriate behaviors immediately after they appear. Employing remedial reading and math services to enhance the student's ability to function within the program.

Compensation. Helping the student realize that each task represents only one of many activities contained in the course and that weaknesses in one area can often be offset by strengths in other areas. It should be communicated to the student that some tasks are inherently difficult and that he/she should not expect to achieve success immediately. Further efforts to compensate for the student would be to modify or adjust the delivery of instruction to extend over segments of several class periods. In addition, reinforcement during the early stages of instruction should be amply provided.

Note: Basically, "compensation" involves the instructor's modifications to the curriculum, learning environment, and instruction which has been discussed in this overview.

Circumvention. If the vocational program is a way out of reach for a student, for example, due to a course requirement of a relatively high level of reading skill, it may become necessary for the student to "circumvent" this difficulty by discussing alternate training programs with a vocational counselor.

Summary

Modification of curriculum, learning environment, and instruction can be an important key to successful employment training for special needs students. It requires that the instructor know his/her content completely, but the benefits to all students will likely be extraordinary.

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LESSON PLANS

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PREFACE

The Educational Development and Training Center at East Texas State University is striving to provide needed materials to vocational instructors within the state.

The purpose of this publication is to assist instructors in improving instruction. As these materials are used, it is hoped that student performance will improve and students will be better prepared to assume a role in the field of General Mechanical Repair.

Instructional materials in this publication are written in terms of student performance, using measurable objectives. This approach augments the teaching-learning process. Criterion-referenced evaluation instructions are provided for uniform measurement of student progress. In addition to evaluating recall information, teachers are encouraged to evaluate the other areas, including progress and the finished product.

The instructor should, where appropriate, reinforce the application of basic academic skills. For example, when addressing the area of study, the instructor should stress to students that they will be applying specific mathematical skills such as addition, subtraction, multiplication, and division that they have learned in previous academic courses. Effective teaching practices research, and consequently the Texas Teacher's Appraisal System, emphasizes the relationship of new learning to prior or future learning. In some cases, specific academic skills needed to complete job tasks may not have yet been addressed in the academic courses in which the students have been enrolled. If this is the case, the vocational instructor should introduce and explain the academic skills, and collaboratively work with the appropriate academic teachers. Students should then achieve a level of mastery that will allow them to perform the job tasks. Instructors of vocational courses are encouraged to work closely with instructors of academic courses to ensure that students are taught fundamental academic principles correctly.

Every effort has been made to make this publication basic, readable, and by all means, usable. Three vital areas of instruction (motivation, personalization, and localization) are not included in this publication; however, they should be capitalized on by the instructor. Only then will this publication really become a vital part of the teaching-learning process.

75.88 Trade and Industrial Education

(a) The elements in this subsection are common to all trade and industrial courses unless otherwise indicated and shall be included in each course at the appropriate level. They are described here to preclude repetitions in each course. Every school offering trade and industrial education shall provide courses which include the following essential elements:

(1) Leadership concepts and skills. The student shall be provided opportunities to:

(A) demonstrate skills, characteristics, and responsibilities of leaders and effective group members;

(B) demonstrate a knowledge of parliamentary procedure principles;

(C) plan and conduct leadership activities; and

(D) prepare for effective citizenship and for participation in our democratic society.

(2) Concepts and skills related to successful employment and/or postsecondary training. The student shall be provided opportunities to:

(A) identify employment opportunities and preparation requirements in chosen fields;

(B) identify effective methods to secure and terminate employment;

(C) demonstrate effective communication skills both oral and written and follow through on assigned tasks;

(D) demonstrate dependability and punctuality;

(E) demonstrate productive work habits and attitudes;

(F) understand the importance of taking pride in the quality of work performed;

(G) recognize the dignity in work;

(H) develop skills in planning and organizing work;

(I) apply required methods and sequences when performing tasks;

(J) apply principles of time management and work simplification when performing assigned tasks;

(K) identify ethical practices and responsibilities; and

(L) understand the importance of the application of organizational policies and procedures.

(3) Concepts and skills associated with entrepreneurship. The student shall be provided opportunities to:

(A) identify opportunities for business ownership;

(B) understand the risk and profit motive factor;

(C) understand the elements and advantages of the free enterprise system; and

(D) explain the role of small business in the free enterprise system.

(4) Concepts and skills related to safety and safe working conditions. The student shall be provided opportunities to identify and apply safe working practices to all training situations.

(5) Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:

(A) understand the importance of maintaining good health and proper appearance for effective job performance;

(B) understand oneself and others;

(C) exercise self-control;

(D) accept and use criticism;

(E) recognize basic human relationships as they relate to business success; and

(F) demonstrate characteristics for successful working relationships.

(6) Concepts and skills related to personal and business management. The student shall be provided opportunities to:

(A) explain how management assists in reaching personal and family goals;

(B) explain the management process;

(C) describe the role of management in controlling stress;

(D) identify and understand personal checking accounts;

(E) identify and understand personal loan application processes;

(F) identify and understand different financial institutions;

(G) identify the role and function of business management:

(H) understand the lines of authority; and

(I) identify effective supervisory techniques.

(7) Concepts and skills associated with the specific occupation being taught. The student shall be provided opportunities to:

(A) understand the basic concepts of and develop proficiency in the occupational area for which instruction/training is provided;

(B) develop a fundamental understanding of mathematical principles and scientific procedures;

(C) understand terminology utilized;

(D) identify tools, equipment, and materials used; and

(E) develop and demonstrate appropriate techniques for the selection, use, maintenance, and storage of tools, equipment, and materials.

(ddd)Coordinated vocational-academic education (CVAE)—general mechanical repair (2-3 units) shall include the essential trade and industrial education elements and the following essential elements:

(1) Concepts and skills associated with automobile mechanics. The student shall be provided opportunities to:

(A) understand the functions of the major automobile components;

(B) perform basic preventive maintenance functions on the automobile;

(C) demonstrate proper techniques in performing a tune-up on an automobile; and

(D) remove, repair, and replace automobile brake system components.

(2) Concepts and skills associated with small engine repair. The student shall be provided opportunities to:

(A) understand the functions of the small gasoline engine and its components;

(B) identify types of small gasoline engines;

(C) understand the proper fuel and fuel mixtures required for various types of small engines;

(D) service and repair small engine fuel systems, lubrication systems, and starting systems; and

(E) troubleshoot and repair small engines.

(3) Concepts and skills associated with welding. The student shall be provided opportunities to:

(A) understand the basic theory of oxyfuel welding, brazing, and cutting;

(B) utilize the oxyfuel cutting process to produce freehand cuts;

(C) weld and braze metal plate using the oxyfuel process;

(D) understand the basic theory of shielded metal arc welding; and

(E) utilize the shielded metal arc process to weld butt and tee joints on metal plate.

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Automotive Shop Safety

TOPIC: Safety

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify safety and point out unsafe practices in the automotive shop.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able participate in safety operations and practices in the automotive shop.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS:
Safety glasses
Fire extinguishers
Fireproof shop towel canister
Vapor-proof fuel container
Broken hammer handle
Bent screwdriver

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-1-IS
II-1-AS
II-1-JS-1
II-1-JS-2
II-1-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

There are many opportunities in the General Mechanical Repair field for those who are willing to work. By the end of the lesson you will be familiar with the safety procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-1-IS as a guide, discuss how safety can be used in the shop.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) list any additional safety procedures to be used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-1-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of various safety procedures.

THE NEXT LESSON IS: Organize a Safety Poster

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Automotive Shop Safety	
TOPIC:	Organize a Safety Poster	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(E)	
TYPE OF LESSON:	Cognitive, psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify safety and point out unsafe practices in the automotive shop.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to make effective safety posters.	
TOOLS AND EQUIPMENT:	12-in. ruler Pencil Scissors	Glue Scotch tape Overhead projector
MATERIALS:	20-in. x 30-in. poster board	
TEACHING AIDS:	Chalkboard, make transparencies of art from information sheet	
REFERENCES:	*General Mechanical Repair* II-1-IS II-1-JS-1	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important that safety posters are placed to be most effective. By the end of this lesson you will be able to understand the use and placement of posters.

To help you understand how safety posters are used, let's look at what makes them effective. Humor can be very effective, (place TM-12 on overhead projector). What is this poster trying to tell us? What would be a good caption? (If needed, repeat this activity using other transparency masters from the preceding lesson.)

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-1-IS as a guide, review procedures used for safety.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate and discuss how various posters are developed. In addition, you may choose to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-1-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the effectiveness of safety posters in the shop.

THE NEXT LESSON IS: Inspect the Shop for Safety Features

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Automotive Shop Safety	
TOPIC:	Inspect the Shop for Safety Features	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)	
TYPE OF LESSON:	Cognitive, psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify safety and point out unsafe practices in the automotive shop.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to inspect an automotive shop correctly.	
TOOLS AND EQUIPMENT:	Pencil Clip board Safety glases	Overhead projector
MATERIALS:	Inspection forms	
TEACHING AIDS:	Chalkboard. **Note:** *Make transparency of JS-2.*	
REFERENCES:	*General Mechanical Repair* II-1-IS II-1-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to understand safety inspection procedures. To give you some real-life practice, we're going to divide into teams and inspect this shop. I'll tell you now, there are several things wrong here, but it will be up to you to find out **what** and **where**. Now, let's take a look at this form, and discuss exactly what we're looking for... By the end of the lesson, you will be more familiar with the use of shop safety inspection.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-1-IS as a guide, review safety procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) tell class why shop inspection is important. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-1-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to inspect the shop.

THE NEXT LESSON IS: Safely Place a Car on Jack Stands

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Automotive Shop Safety
TOPIC:	Safely Place a Car on Jack Stands
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify safety and point out unsafe practices in the automotive shop.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to place a car on a jack stand correctly.

TOOLS AND EQUIPMENT:	Overhead projector Two-ton hydraulic jack Four jack stands	Automobile Safety glasses
MATERIALS:	N/A	
TEACHING AIDS:	Make transparencies from information and TMs as needed	
REFERENCES:	*General Mechanical Repair* II-1-IS II-1-JS-3	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Properly lifting and supporting a car is critically important. Do it right, and you greatly simplify making repairs. Do it wrong, and at the very least, you'll end up scared and embarrassed. At worst, one of you will be crippled or dead.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-1-IS as a guide, review the procedures to be used with jack stands.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain procedures to be used with jack stands, and the purpose of location for jack stands. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-1-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the proper safety procedures to use.

THE NEXT LESSON IS: Engine Parts and Operation of Engine.

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Principles
TOPIC:	Engine Parts and Operation of Engines
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to define the major engine parts and discuss their relationship to one another.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to discuss four-cycle engines and the relationship of the crankshaft, pistons, rods, valves, and bearings.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required. However, if loose engine parts are available for demonstration purposes, it would enhance the student's understanding.
TEACHING AIDS:	Chalkboard, make transparencies of art from information sheet
REFERENCES:	*General Mechanical Repair* II-2-IS II-2-AS

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Before you can service, repair, or modify **anything**, you have to understand how it works. Today, we're going to begin learning about the basic components of an automobile engine. It's important that you know the function of each of these parts, and how they work together to make an engine run.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-2-IS as a guide, review information on fuel tanks.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) choose various engine parts and discuss their operation. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-2-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding engine parts and their operation.

THE NEXT LESSON IS: Fuel Systems

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LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair
TOPIC:	Fuel System
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will understand parts of the fuel system.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials needed
TEACHING AIDS:	Chalkboard, transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-AS II-3-JS-1 II-3-JS-2 II-3-JS-3 II-3-JS-4 II-3-JS-5 II-3-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The automotive fuel system has quite a job to do. I must **safely** store a poisonous, highly explosive liquid. It must deliver this substance to the engine, and convert it into a form that can be used to make power.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review the purpose of the fuel system.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss various parts of the fuel system. In addition, you may choose to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the operation of the fuel system.

THE NEXT LESSON IS: Remove Fuel Tank

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair
TOPIC:	Remove Fuel Tank
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove fuel tank correctly.

TOOLS AND EQUIPMENT:	Socket set Hose clamp pliers	Common screwdriver Phillips screwdriver
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-JS-1	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

According to our definition of a fuel system, the first thing it must do is safely store the fuel. Today, we'll be working with the **storage** part of the system, the gas tank.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review information on fuel tanks.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain procedures to remove a fuel tank, and safety precautions used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to remove the fuel tank.

THE NEXT LESSON IS: Repair Fuel Tank Indicating System

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair	
TOPIC:	Repair Fuel Tank Indicating System	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)	
TYPE OF LESSON:	Psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to repair fuel tank correctly.	
TOOLS AND EQUIPMENT:	Drain pan Combination wrenches Common screwdriver	Phillips screwdriver Hose clamp pliers Nut driver set
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-JS-3	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

We need to have some idea of how much fuel we're storing in our fuel system. The fuel sending unit and indicator tell us. We're going to learn how to troubleshoot and repair this part of the system. This ensures that the information they give us is accurate.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review the purpose of the fuel system.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss safety and terms used with procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the proper way to repair parts of the fuel system.

THE NEXT LESSON IS: Check Fuel System for Leaks

II-3-LP-3

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair
TOPIC:	Check Fuel System for Leaks
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to check fuel systems correctly for leaks.

TOOLS AND EQUIPMENT:	Common screwdriver Hose clamp pliers Set of open end wrenches
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is very important to follow all safety rules when checking for fuel leaks. Remember, no open flames or sparks! Today, we're going to concentrate on the procedures used to find and repair fuel leaks **safely**.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review procedures regarding fuel systems.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain procedures to check for fuel leaks. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the purpose of checking the fuel system for leaks.

THE NEXT LESSON IS: Remove and Replace Fuel Pump

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair
TOPIC:	Remove and Replace Fuel Pump
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace fuel pump correctly.

TOOLS AND EQUIPMENT:	Open end wrenches Socket set Hose clamp pliers
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It's the fuel pump's job to **transfer** the fuel from the tank to the carburetor. We're going to look at fuel pump operation, testing, and repair.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review and discuss procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented.If the students are not perceiving the subject matter, then use reteach activities.If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) to demonstrate procedures to remove and replace the fuel pump. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to remove and replace the fuel pump.

THE NEXT LESSON IS: Clean or Replace Fuel Filter (Bowl and ceramic insert types)

II-3-LP-5

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Fuel System Operation and Repair

TOPIC: Clean or Replace Fuel Filter (Bowl and ceramic insert types)

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(C)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to clean and replace fuel filter correctly.

TOOLS AND EQUIPMENT:
Overhead projector
Hose clamp pliers
Combination wrenches
Air hose
Flare nut wrenches

MATERIALS: No special materials required

TEACHING AIDS: Make transparencies from art in information sheet

REFERENCES:
General Mechanical Repair
II-3-IS
II-3-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Clean fuel is critical for proper carburetion. Silt, water, rust, and other contaminants clog the passages withing the carburetor. Fuel filters are used to prevent this. Today, we'll learn how to inspect and service these important filters.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review proper way to clean filters.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how filters are removed and replaced. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures to remove, clean and replace filters.

THE NEXT LESSON IS: Check and Replace Needle Valve in Carburetor

II-3-LP-6

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair	
TOPIC:	Check and Replace Needle Valve in Carburetor	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(C)	
TYPE OF LESSON:	Cognitive, psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to check and replace needle valve in carburetor correctly.	
TOOLS AND EQUIPMENT:	Overhead projector Open end wrenches Phillips screwdriver	Common screwdriver Combination wrenches
MATERIALS:	No special materials required	
TEACHING AIDS:	Make transparencies from art in information sheet	
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-JS-6	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The needle and float determine the fuel level in the carburetor. Fuel level is important, because it determines how quickly the main set circuit begins operating. This affects both performance and economy. By learning to inspect and replace the needle and seat assembly and to set the float level accurately, you will ensure smooth running and good fuel economy.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, discuss the process to remove and replace needle valve.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures and demonstrate ability to replace the needle valve. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used to replace the needle valve.

THE NEXT LESSON IS: Remove and/or Replace Air Filter

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Fuel System Operation and Repair
TOPIC:	Remove and/or Replace Air Filter
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and/or replace air filter correctly.

TOOLS AND EQUIPMENT:	Overhead projector Pliers Dry or paper type filter
MATERIALS:	No special materials required
TEACHING AIDS:	Make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-3-IS II-3-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

In addition to clean fuel, a carburetor must have clean air to do its job. Today, we'll discuss inspecting and servicing air cleaners.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-3-IS as a guide, review procedures used to change filters.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and demonstrate procedures used to change air filters. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-3-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of air filters.

THE NEXT LESSON IS: Electrical Systems

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Electrical Systems
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(D), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to find and repair open and shorted circuits.

TOOLS AND EQUIPMENT:	Overhead projector	
MATERIALS:	No special materials	
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet	
REFERENCES:	*General Mechanical Repair*	
	II-4-IS	II-4-JS-4
	II-4-AS	II-4-JS-5
	II-4-JS-1	II-4-JS-6
	II-4-JS-2	II-4-JS-7
	II-4-JS-3	II-4-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The electrical system provides power for cranking the engine, ignition, lighting and signaling, and gauges and warning lights. You must be able to describe the components in a typical automotive electrical system and show their function.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, review procedures used to check the electrical system.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and demonstrate procedures used with the electrical system. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems encountered during the lesson.

THE NEXT LESSON IS: Test Light Bulbs

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LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Test Light Bulbs
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(D), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
PECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to test light bulbs correctly.

TOOLS AND EQUIPMENT:	Overhead projector Ohmmeter (set on ohms) Good lighted bulb (two terminal) Burned out light bulb (two terminal)
MATERIALS:	No special materials
TEACHING AIDS:	Make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Light bulbs provide illumination for driving (headlights/tail lights), gauges (speedometer, temperature indicator, etc.), and signaling (turn signals, brake lights). We will discuss inspecting and replacing various bulbs found in a typical automobile.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, discuss the types of bulbs used.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain how to test bulbs.. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Make Splices in Wire (Conductor)

265

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Make Splices in Wire (Conductor)
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(7), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psycnomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to splice wires correctly.

TOOLS AND EQUIPMENT:	One piece of #18 gauge coated wire, 4 ft long Wire strippers Diagonal pliers
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To ensure good current flow, it is important to be able to make a good splice in the wire (conductor). By the end of the lesson, you will be able to demonstrate three types of non-solder splices.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, discuss types of wires and splices.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate to class and explain how to make a good splice. In addition, you may to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-2 as independent practice. Discuss types of wires and splices.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to splice wire (conductor) in system.

THE NEXT LESSON IS: Solder Wire

II-4-LP-3

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems	
TOPIC:	Solder Wire	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)	
TYPE OF LESSON:	Cognitive, psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to solder wire corrections correctly.	
TOOLS AND EQUIPMENT:	Diagonal pliers One piece of #18 gauge wire, 12-in. long Wire strippers	Soldering gun Solder (rosin core) Electrical source (1210 volts)
MATERIALS:	No special materials required	
TEACHING AIDS:	No special teaching aids required	
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-3	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Solder splices are used to ensure good contact. This type of connection is strong, and resists both vibration and corrosion. This lesson will cover solder splices.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, discuss the use of solder.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain how to solder a connection. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any questions that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Performing Wire Test

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Electrical Systems

TOPIC: Perform Wiring Test

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to perform wiring test correctly.

TOOLS AND EQUIPMENT:
Ohmmeter
Wire mockups
1. Open wire (wire broken under coating)
2. Shorted wire (grounded in metal tube)
3. Identify wire (3 wires wrapped)
4. Two fuses (1 good, 1 blown)

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-4-IS
II-4-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Test equipment saves time and effort. An ohmmeter indicates if current can flow through a wire. This allows us to check for broken, shorted, or grounded wiring. By the end of this lesson, you will be able to use an ohmmeter to identify various wiring faults correctly.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, discuss purpose of wire test.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain how to perform a wire test. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheets.

THE NEXT LESSON IS: Identify Battery Types and Voltages

II-4-LP-5

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Identify Battery Types andVoltages
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to identify batteries and voltages correctly.

TOOLS AND EQUIPMENT:	One 12-volt battery (wet cell) One 6-volt battery (wet cell) Six 1½-volt batteries (dry cell) Voltmeter
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The identification of battery types and voltage is very important. By the end of the lesson, you will be able to identify a battery as either wet cell or dry cell, give its voltage, and demonstrate the correct use of the voltmeter.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, review procedures and battery voltages.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain the voltage and battery types. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of different types of batteries and their use.

THE NEXT LESSON IS: Remove, Clean and Replace Battery

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Remove, Clean, and Replace Battery
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd(1)(C)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove, clean and replace a battery.

TOOLS AND EQUIPMENT:	Open end wrench set	Grease
	Soda and water solution	Safety glasses or face shield
	Terminal cleaner	Battery strap
MATERIALS:	No special materials required	
TEACHING AIDS:	No special teaching aids required	
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-6	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Proper care and maintenance of batteries greatly extend their life. This lesson will cover battery service and familiarize you will battery maintenance terms.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, review procedures for batteries.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate proper cleaning procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any questions which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Check Battery with Hydrometer

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Check Battery with Hydrometer
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use a hydrometer to check batteries properly.

TOOLS AND EQUIPMENT:	Hydrometer Battery (wet cell) Safety glasses or face shield
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The hydrometer is an important tool to use with batteries. It tells us the interior condition of individual cells. By the end of the lesson, you will be able to use of the hydrometer to gauge battery condition accurately.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, review procedures used to check batteries.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate the use of the hydrometer. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any questions that may have occurred during completion of the job sheet.

THE NEXT LESSON IS: Connect, Operate and Disconnect a Battery Charger

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Electrical Systems
TOPIC:	Connect, Operate and Disconnect a Battery Charger
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to explain the purpose of the electrical system and operation of the electrical system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to connect, operate, and disconnect a battery charger properly.

TOOLS AND EQUIPMENT:	Socket set Battery charger Safety glasses or face shield
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-4-IS II-4-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Battery chargers are found in all automotive shops. This piece of equipment allows complete servicing of any automotive wet cell battery. By the end of this lesson, you will demonstrate the correct way to test, connect, and charge a battery.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-4-IS as a guide, review battery charger information.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and demonstrate procedures to connect the battery charger. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-4-JS-8 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred during the completion of the job sheets.

THE NEXT LESSON IS: Ignition System Terminology

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Ignition System

TOPIC: Ignition System Terminology

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(C)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test and service the ignition system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will explain the purpose of the ignition system, test and replace ignition parts.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special material required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheets

REFERENCES: *General Mechanical Repair*

II-5-IS
II-5-AS
II-5-JS-1
II-5-JS-2
II-5-JS-3
II-5-JS-4
II-5-JS-5
II-5-JS-6
II-5-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

All gasoline engines require an initial spark to ignite the air/fuel mixture and begin the combustion process. The ignition system supplies and distributes these high-voltage sparks. By the end of this lesson, you will be able to identify and describe ignition components.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss terminology for the ignition system. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology used for ignition systems.

THE NEXT LESSON IS: Change Spark Plus

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Ignition System

TOPIC: Change Spark Plugs

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(C)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test and service the ignition system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to change spark plugs correctly.

TOOLS AND EQUIPMENT:

Proper size socket
Ratchet drive
Extension (if required)
Thickness gauge
Torque wrench
Auto manual
Fender cover
New spark plugs

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:

General Mechanical Repair
II-5-IS
II-5-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Spark plugs not only start the combustion process, they also serve as indicators of mixture strength and fuel quality. In this lesson, you will learn to identify plug heat range, diagnose cylinder and mixture conditions, and install new spark plugs correctly.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the different types of plugs and their use. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any questions that may have occurred during completion of the job sheet.

THE NEXT LESSON IS: Change Breaker Points and Condenser

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Ignition System
TOPIC:	Change Breaker Points and Condenser
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test and service the ignition system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to change the breaker points and condenser.

TOOLS AND EQUIPMENT:

Common screwdriver
Thickness gauge
Fender cover
Dwell meter
Allen wrench set
New breaker points and condenser
Auto manual

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-5-IS
II-5-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The breaker points and condenser are essential elements for many early style ignition systems. By the end of the lesson, you will be able to replace and adjust these components correctly.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology used with breaker points and condenser. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology used with breaker points and condenser.

THE NEXT LESSON IS: Change Spark Plug Wires

II-5-LP-3

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Ignition System
TOPIC:	Change Spark Plug Wires
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test and service the ignition system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to change spark plug wires.

TOOLS AND EQUIPMENT:	Fender cover New plug wires
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-5-IS II-5-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Spark plug wires deliver the spark from the distributor to the plug. In a modern, high-revving, fuel-injected engine, each wire can carry up to 40,000 volts 50 times a second. Plug wires take quite a beating, so it's a good idea to replace them every four years or 50,000 miles. This lesson discusses how to do that.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and show the class how to change spark wires. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any questions regarding any problems that may have occurred during the completion of the job sheet.

THE NEXT LESSON IS: Inspect Distributor Cap

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Ignition System
TOPIC:	Inspect Distributor Cap
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test and service the ignition system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to inspect the distributor cap.

TOOLS AND EQUIPMENT:	Common screwdriver Fender cover
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-5-IS II-5-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Distributor caps are subject to cracking, carbon tracking, and corrosion. This lesson will demonstrate how to inspect, clean, and replace the cap.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) show different distributor caps and explain the differences. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Using the Tachometer

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Ignition System
TOPIC:	Using the Tachometer
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test and service the ignition system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use the tachometer.

TOOLS AND EQUIPMENT:

Dwell-tach
Common screwdriver
Allen wrench set
Auto manual
Fender cover

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-5-IS
II-5-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The dwell-tach is an essential tool to be used with the ignition system. It verifies correct points setting, and allows accurate carburetor settings.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the use of the tachometer. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred during the completion of the job sheet.

THE NEXT LESSON IS: Checking the Ignition Timing

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT: Ignition System

TOPIC: Checking the Ignition Timing

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test and service the ignition system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to check the ignition timing.

TOOLS AND EQUIPMENT:
Timing light
Chalk
Box-end wrenches
Fender cover

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-5-IS
II-5-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Accurate ignition timing is essential for both horsepower and mileage. By the end of the lesson, you will be able to adjust ignition timing accurately.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate the use of a timing light and how to connect it. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the connection of the timing light and procedures.

THE NEXT LESSON IS: Using the Voltmeter

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Ignition System
TOPIC:	Using the Voltmeter
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test and service the ignition system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use the voltmeter.

TOOLS AND EQUIPMENT:	Voltmeter Fender cover
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-5-IS II-5-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

As we saw in the unit on electrical systems, test equipment saves time and effort. We used the voltmeter before, to troubleshoot battery problems. Now we'll use it to help diagnose ignition and starter problems.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-5-IS as a guide, review terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology and use the voltmeter. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-5-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any procedures and the connection of the voltmeter to the systems.

THE NEXT LESSON IS: Lubrication

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Lubrication System

TOPIC: Lubrication

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will understand the use of lubricants and the lubrication system, identify and service parts as needed.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES: *General Mechanical Repair*

II-6-IS
II-6-AS
II-6-JS-1
II-6-JS-2
II-6-JS-3
II-6-JS-4
II-6-JS-5
II-6-JS-6
II-6-JS-7
II-6-JS-8
II-6-JS-9
II-6-JS-10

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Oil is the life blood of an engine. If the lubrication system fails, and oil pressure drops to zero, an engine cannot run for more than 40 seconds without serious internal damage. During this lesson, you will learn about the dirrerent components in an automotive lubrication system.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, review terminology used.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss terminology used for different lubricants. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of different grades of lubricants and oil.

THE NEXT LESSON IS: Check Engine Oil Level

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Lubrication System
TOPIC:	Check Engine Oil Level
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to check the engine oil level.

TOOLS AND EQUIPMENT:	Shop towel Oil, if needed Oil spout
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-6-IS II-6-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Checking the engine oil is important to assure proper lubrication. By the end of the lesson you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, review procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate proper way to check oil level. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures.

THE NEXT LESSON IS: Change Engine Oil

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Lubrication System
TOPIC:	Change Engine Oil
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to change engine oil.

TOOLS AND EQUIPMENT:	Shop towel Proper size wrench Drain pan Auto manual	Oil spout Hydraulic floor jack Two jack stands Fender cover
MATERIALS:	No special materials required	
TEACHING AIDS:	No special teaching aids required	
REFERENCES:	*General Mechanical Repair* II-6-IS II-6-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Clean oil is essential for long engine life. In this lesson we will discuss the oil change, an important step in any preventive maintenance program.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, review terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate the knowledge of tools and equipment used to change the engine oil. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding problems which may have occurred when completing the job sheet.

THE NEXT LESSON IS: Change Engine Oil Filter (Screw-on Type)

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Lubrication System
TOPIC:	Change Engine Oil Filter (Screw-on Type)
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to change engine oil filter.

TOOLS AND EQUIPMENT:	Shop towel Oil filter wrench New oil filter	Drain pan Fender cover
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-6-IS II-6-JS-3	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The engine oil filter is important to keep the oil clean and the engine in good condition. This lesson will familiarize you with the correct way to remove and install an oil filter.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss the importance of the oil filter.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss types of oil filters and at what intervals they are changed. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of oil filters and terminology.

THE NEXT LESSON IS: Check Automatic Transmission Fluid Level

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Lubrication System	
TOPIC:	Check Automobile Transmission Fluid Level	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)	
TYPE OF LESSON:	Cognitive, psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to check automobile transmission fluid level.	

TOOLS AND EQUIPMENT:	Shop towel Transmission fluid	Funnel Fender cover
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-6-IS II-6-JS-4	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The oil level in automatic transmission is important for the operation of the transmission. By the end of the lesson, you will be able to inspect this accurately and fill to the proper level.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss importance of fluid levels.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate to the class the correct procedures to check automatic transmission fluid level. In addition, you may choose to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Change Automatic Transmission Fluid

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Lubrication System

TOPIC: Change Automatic Transmission Fluid

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to change automobile transmission fluid.

TOOLS AND EQUIPMENT:

Shop towel
Proper size wrench to remove drain plug
Drain pan
Transmission fluid as required
Funnel
Hydraulic floor jack
Fender cover
Two jack stands

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-6-IS
II-6-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Clean transmission fluid contributes to smooth shifts and long transmission life. This lesson will cover service procedures for fluid and filter replacement.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss proper fluid use.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain procedure for changing automatic transmission fluid. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred during the completion of the job sheet.

THE NEXT LESSON IS: Check Standard Transmission Oil Level

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Lubrication System

TOPIC: Check Standard Transmission Oil Level

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to check standard transmission oil level.

TOOLS AND EQUIPMENT:
- Shop towel
- Transmission oil
- Wrench to fit transmission plug
- Hydraulic floor jack
- Two jack stands

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-6-IS
II-6-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Just as in an automatic transmission, clean oil is critical to a manual transmission. This lesson covers checking and topping up the oil level in a standrad transmission.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the procedures used to check the oil level on a standard transmission. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to check the standard transmission oil.

THE NEXT LESSON IS: Check Differential Oil Level

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT: Lubrication System

TOPIC: Check Differential Oil Level

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to check differential oil level.

TOOLS AND EQUIPMENT:

Shop towel
Transmission oil
Wrench to fit differential plug
Hydraulic floor jack
Two jack stands

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-6-IS
II-6-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The differential oil should be checked periodically to keep the correct oil level. By the end of the lesson you will be familiar with procedures used.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss procedures to check the differential oil.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the purpose of and procedures for checking the differential oil. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to check the differential oil.

THE NEXT LESSON IS: Check Manual Steering Gear Oil Level

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Lubrication System
TOPIC:	Check Manual Steering Gear Oil Level
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to check the manual steering gear oil level.

TOOLS AND EQUIPMENT:	Shop towel Wrench to fit manual steering plug Fender cover Gear oil
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-6-IS II-6-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The manual steering gear oil level should be checked periodically to keep the gears lubricated. By the end of the lesson you will be familiar with the procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to check the manual steering oil level. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-8 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Check Power Steering Pump Oil Level

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Lubrication System
TOPIC:	Check Power Steering Pump Oil Level
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to check the power steering pump oil level.

TOOLS AND EQUIPMENT:	Shop towel Power steering oil Fender cover
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-6-IS II-6-JS-9

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is essential to keep the correct amount of oil in the power steering pump for it to operate correctly. This oil not only provides the hydraulic force that makes the system work, it also cleans, cools, and lubricates the steering gear.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss the difference of types of oil used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain and discuss procedures to check power steering oil. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-9 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to check power steering oil.

THE NEXT LESSON IS: Lubricate Chassis

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Lubrication System

TOPIC: Lubricate Chassis

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect and service the lubrication system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lubricate the chassis.

TOOLS AND EQUIPMENT:
Grease gun and appripriate grease
Shop towel
Auto service manual
Hydraulic floor jack
Two jack stands

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-6-IS
II-6-JS-10

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Chassis lubrication is important to overall use of a vehicle. It ensures adequate steering and suspension performance, minimizes wear, and helps prevent squeaks and rattles.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-6-IS as a guide, discuss procedures used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) pick a specific area of the chassis and discuss procedures to lubricate this part. In addition, you may choose to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-6-JS-10 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Cooling Systems

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Cooling Systems
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to test, check and replace parts of the cooling system.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-AS II-7-JS-1 II-7-JS-2 II-7-JS-3 II-7-JS-4 II-7-JS-5 II-7-JS-6 II-7-JS-7 II-7-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The cooling system maintains the engine operating temperature within a fairly narrow range. This is essential for optimum horsepower and mileage, as well as proper funtioning of climate controls, emissions systems, and the automatic transmission. This unit covers inspection, repair, and service of the automotive cooling system.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, discuss how safety can be used in the shop.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the use and importance of the cooling system. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding terminology and procedures used with the cooling system.

THE NEXT LESSON IS: Pressure Check Radiator

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Pressure Check Radiator
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to pressure check the radiator.

TOOLS AND EQUIPMENT:	Cooling system pressure tester Auto service manual	Fender cover face shield
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-JS-1	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Pressure checking the radiator will show up leaks and weak spots to keep coolant from being lost and damaging the engine. By the end of this lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, review procedures used for safety.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate the ability and discuss procedures to pressure check the radiator. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems concerning procedures to pressure check the radiator.

THE NEXT LESSON IS: Pressure Check Radiator Cap

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Engine Cooling System

TOPIC: Pressure Check Radiator Cap

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to check the pressure on the radiator cap.

TOOLS AND EQUIPMENT:
Cooling system pressure tester
New radiator cap
Fender cover
Face shield

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-7-IS
II-7-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The radiator cap pressure must be correct to keep the coolant in the radiator and engine. By the end of the lesson, you will be more familiar with correct procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, review safety procedures to be used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) tell class why shop inspection is important. In addition, you may choose to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any procedures to check pressure on the radiator cap.

THE NEXT LESSON IS: Inspect Water Pump

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Inspect Water Pump
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to inspect the water pump properly.

TOOLS AND EQUIPMENT:	Drive socket set Fender cover
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Inspection of the water pump can prevent expensive problems with the engine. By the end of this lesson, you will be familiar with the procedures to inspect the water pump.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, review the procedures to be used with jack stands.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures and reason to inspect the water pump. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures to inspect the water pump.

THE NEXT LESSON IS: Remove and Replace Thermostat

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Remove and Replace Thermostat
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace the thermostat.

TOOLS AND EQUIPMENT:	Drive socket set Hose clamp pliers Common screwdriver Gasket scraper	Drain container Fender cover Gasket sealant
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-JS-4	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The thermostat is important to keep the coolant temperature correct. When it does not work properly, the engine temperature is incorrect, and there are problems with warm up, overheating, emission system functions, climate control efficiency, transmission operation, and fuel mileage. By the end of the lesson, you will be familiar with the correct procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, discuss procedures to remove and replace the thermostat.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the tools used to remove and replace the thermostat. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Test Thermostat for Operation

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Test Thermostat for Operation
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to test the thermostat for operation.
TOOLS AND EQUIPMENT:	A metal container filled with water Oxyacetylene welding unit, hot plate, or other heat source Thermometer A wire hook
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Testing the thermostat can tell you if there is a problem other than the thermostat if you are having a heat problem. By the end of the lesson, you will be familiar with procedures to be used.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, review procedures to be used.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate procedure to test the thermostat and explain the procedure. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedure to test the thermostat.

THE NEXT LESSON IS: Remove, Inspect and Replace Hoses

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Remove, Inspect and Replace Hoses
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove, inspect, and replace the hoses correctly.

TOOLS AND EQUIPMENT:	Common screwdriver/nut driver as needed Hose clamp pliers Drain container Fender cover Face shield
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Hoses need to be inspected periodically to keep them in good condition. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, discuss various engine parts and their use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display hoses of different types and discuss problems to look for. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to use when testing hoses.

THE NEXT LESSON IS: Inspect Fan Belts and Set Tension

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT: Engine Cooling System

TOPIC: Inspect Fan Belts and Set Tension

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to inspect fan belts and set the tension.

TOOLS AND EQUIPMENT:
Tension gauge
Straightedge
Ruler
Fender cover
Open-end, box-end wrench set

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-7-IS
II-7-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Fan belts need to be checked periodically for stretching and cracks in order to operate properly. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, discuss procedures to inspect fan belts and set tension.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss what to look for and how to correct any problem that is found. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to inspect and set the tension on the belts properly.

THE NEXT LESSON IS: Test, Remove and Replace Fan Clutch

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Engine Cooling System
TOPIC:	Test, Remove and Replace Fan Clutch
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect, test, and service the parts within the cooling system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to test, remove, and replace the fan clutch.

TOOLS AND EQUIPMENT:	Open end wrench Shop towel Fender cover
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-7-IS II-7-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

In this lesson you will learn how to test, remove and replace the fan clutch. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-7-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss proper procedures to use. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-7-JS-8 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Exhaust System

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Exhaust System

TOPIC: Exhaust System

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to examine and replace components of the exhaust system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will test, remove, and replace components in the exhaust system and explain the purpose of each component.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES: *General Mechanical Repair*

II-8-IS
II-8-AS
II-8-JS-1
II-8-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The exhaust system is important in removing gas fumes to the rear of the vehicle and away from persons in the vehicle. By the end of the lesson, you will be familiar with the terminology and procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-8-IS as a guide, discuss procedures used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology and procedures with the class. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-8-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used.

THE NEXT LESSON IS: Change a Tail Pipe

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Exhaust System

TOPIC: Change a Tail Pipe

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to examine and replace components of the exhaust system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to change a tail pipe correctly.

TOOLS AND EQUIPMENT:

Pneumatic chisel
Box-end wrench set
Hydraulic jack
Jack stands
Wire brush
File

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-8-IS
II-8-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When changing out the tail pipe, you need to be aware of the tools and materials used. By the end of the lesson, you will be familiar with procedures used.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-8-IS as a guide, discuss the use of the tools to remove the tail pipe.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display tools and discuss the use of each tool. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-8-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred when completing the job sheet.

THE NEXT LESSON IS: Change Muffler

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Exhaust System
TOPIC:	Change Muffler
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to examine and replace components of the exhaust system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to change the muffler.

TOOLS AND EQUIPMENT:	Power chisel Box-end wrench set Hydraulic jack Jack stands	Wire brush File Exhaust system sealer
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-8-IS II-8-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It's important to change the muffler when holes have developed in the case. The results of leaking carbon monoxide can be deadly. By the end of the lesson, you will be familiar with the procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-8-IS as a guide, discuss the type tools to be used and the procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the purpose and use of tools to change a muffler. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-8-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any procedures to change the muffler.

THE NEXT LESSON IS: Wheel and Tire Terminology

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Wheels and Tires
TOPIC:	Wheel and Tire Terminology
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will inspect, test, and service wheels and tires.
TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-9-IS II-9-AS II-9-JS-1 II-9-JS-2 II-9-JS-3 II-9-JS-4 II-9-JS-5 II-9-JS-6 II-9-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The wheels and tires on a car have 3 jobs: support the weight of the car, provide a safe and comfortable ride, and provide traction for direction and speed. Because they control movement of the car, their condition is critical. This lesson will teach you inspection and repair techniques.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss terminology for wheels and tires.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology and procedures used with tires. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-IS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology used for wheels and tires.

THE NEXT LESSON IS: Remove and Install a Wheel

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Wheels and Tires
TOPIC:	Remove and Install a Wheel
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and install a wheel correctly.

TOOLS AND EQUIPMENT:	Hydraulic floor jack Jack stand Lug wrench as required Shop rag	Large screwdriver Rubber mallet Torque wrench
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-9-IS II-9-JS-1	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The removal and installation of a wheel should be done carefully. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss procedures to remove and install wheel.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the procedures and tools used to remove and install a wheel. In addition, you may choose to continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Inspect a Wheel for Damage

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Wheels and Tires
TOPIC:	Inspect a Wheel for Damage
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to inspect a wheel for damage.

TOOLS AND EQUIPMENT:	Wire brush Shop rag Cleaning vat	Wheel weight tool Car wheel
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-9-IS II-9-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Inspection of wheels is very important. Dents and cracks could cause a wheel to collapse. By the end of the lesson, you will be able to inspect wheels correctly for defects and damage.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, explain procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s)display various wheels and explain what to look for. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to check a wheel for damage.

THE NEXT LESSON IS: Remove Tire from Rim

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Wheels and Tires
TOPIC:	Remove Tire from Rim
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove a tire from the rim.

TOOLS AND EQUIPMENT:	Tire mounting and demounting equipment Rubber lubricant or soapy water Tire tools necessary for tire equipment Shop rag Safety glasses
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-9-IS II-9-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The removal of a tire from the rim should be done carefully and safely. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss procedures to be used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain procedure to remove a tire from the rim. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Install Tire on a Rim

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Wheels and Tires

TOPIC: Install Tire on a Rim

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to install a tire on the rim correctly.

TOOLS AND EQUIPMENT:
Tire mounting and demounting equipment
Rubber lubricant or soapy water
Tire tools necessary for tire equipment
Shop rag
Bead expander
Tire pressure gauge
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-9-IS
II-9-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

A tire should be carefully installed on a rim so the wheel is not damaged. By the end of the lesson, you will be familiar with the procedure to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss the procedures and tools to be used.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain the procedures to install a tire on a rim. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and tools to use to install a tire on a rim.

THE NEXT LESSON IS: Repair a Punctured Tire

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Wheels and Tires

TOPIC: Repair a Punctured Tire

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to repair a punctured tire correctly.

TOOLS AND EQUIPMENT:

Patch
Rubber cement
Scissors
Tire-patching tools
Tire pressure gauge
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-9-IS
II-9-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Repairing the puncture in a tire has to be done correctly so the repair will not leak; and the tire will provide a safe and reliable ride. By the end of the lesson, you will be familiar with the procedure to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to repair a punctured tire. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding proper use of tools and procedures.

THE NEXT LESSON IS: Balance a Wheel and Tire

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Wheels and Tires

TOPIC: Balance a Wheel and Tire

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to statically balance a wheel and tire correctly.

TOOLS AND EQUIPMENT:
Tire balancer
Wheel weights
Wheel weight hammer
Chalk
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-9-IS
II-9-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The static tire balancer is an inexpensive and fairly common piece of equipment. Its simple design makes it trouble-free and easy to use. This lesson will teach you balance a wheel and tire assembly accurately.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to balance a wheel and tire. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures and tools used to balance a wheel and tire.

THE NEXT LESSON IS: Rotate the Tires Including Spare

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Wheels and Tires
TOPIC:	Rotate the Tires Including Spare
ESSENTIAL ELEMENT(S):	(a)(4), (d)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the care and handling of wheels and tires.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to rotate the tires, including the spare.

TOOLS AND EQUIPMENT:

Overhead projector
Hydraulic floor jack
Four jack stands
Lug wrench or impact wrench
Rubber mallet
Large common screwdriver
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES:
General Mechanical Repair
II-9-IS
II-9-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

By rotating the tires properly, they will wear more evenly, last longer, and save fuel. By the end of the lesson, you will be familiar with procedures for rotating bias-ply tires.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-9-IS as a guide, discuss tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to rotate the tires correctly. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-9-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done by rough scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to rotate the tire.

THE NEXT LESSON IS: Brake System Terminology and Components

II-10-LP

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Brake and Bearing System Terminology and Components
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to service, remove and replace components in the braking system and dispose of brake waste material.

TOOLS AND EQUIPMENT:	Overhead projector Glue Scotch tape
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, transparencies from art in information sheets
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-AS II-10-JS-1 II-10-JS-2 II-10-JS-3 II-10-JS-4 II-10-JS-5 II-10-JS-6 II-10-JS-7 II-10-JS-8 II-10-JS-9 II-10-JS-10 II-10-JS-11 II-10-JS-12

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The purpose of brakes and their components is very important and service has to be done safely. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS-1 as a guide, discuss the terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) make a display and explain braking components. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding terminology and components of brake system.

THE NEXT LESSON IS: Bearing Systems

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT: Brake and Bearing System

TOPIC: Brake System Inspection

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to inspect a brake system correctly.

TOOLS AND EQUIPMENT:
Tools for wheel and tire removal
Tools for brake and drum removal
Drop light
Inspection mirror
Appropriate shop manual
Clean shop towels
Fender and seat covers

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-10-IS
II-10-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Inspection of the brake system is important to prevent accidents. This lesson will cover potential brake defects and how to repair them.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review and discuss terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) use a display and explain what to look for. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Service the Master Cylinder and Power Booster

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Service the Master Cylinder and Power Booster
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to service a master cylinder and a power booster correctly.

TOOLS AND EQUIPMENT:

	Shop towel	Open-end wrench
	Hose clamp pliers	Brake fluid, proper type
	Common screwdriver	Fender cover

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-10-IS
II-10-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The brake booster multiplies the force exerted on the brake pedal. If this unit fails, brakes become difficult to apply, and it takes much longer to stop the vehicle. In this lesson, you will learn to inspect and service the booster and master cylinder.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review and discuss terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how a master cylinder and power booster is serviced. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheets.

THE NEXT LESSON IS: Replace Brake Shoes

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Replace Brake Shoes
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(D)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to replace brake shoes correctly.

TOOLS AND EQUIPMENT:	Hydraulic floor jack Four jack stands Lug wrench Large common screwdriver Rubber mallet Box-end wrench set Brake-bleeder wrench	Brake-adjusting tool Brake-spring pliers Brake fluid Fender cover Light gauge wire, 18-in. long
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-3	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The replacement of brake shoes is done when the pads are beginning to wear thin or show metal in pad area. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review and discuss tools to be used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the use of the tools and identify each tool. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Rebuild a Wheel Cylinder

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Rebuild a Wheel Cylinder
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to rebuild a wheel cylinder correctly.

TOOLS AND EQUIPMENT:	Cylinder hone	Brake fluid
	Shop rags	Fender cover
	Wheel-cylinder rebuilding kit	Portable electric drill
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-4	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

If the wheel cylinder needs to be rebuilt, it has to be done carefully so the fluid will not leak when completed. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review and discuss terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display a wheel cylinder and explain procedure to rebuild. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Bleeding the Hydraulic System

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Bleeding the Hydraulic System
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(1)(B), (ddd)(1)(D)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to bleed a hydraulic system correctly.

TOOLS AND EQUIPMENT:	Sufficient hand tools for removing master cylinder reservoir covers 3/8-in. or 1/4-in. six-point box-end wrench for opening bleeder screws Fender covers, drop light, and creeper Pressure tank brake bleeding equipment Brake fluid Clean glass container and bleeder hose Bulb type syringe for filling the reservior with brake fluid Clean shop towels Appropriate shop service manual A helper mechanic
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Bleeding the hydraulic system is very important to remove air from the hydraulic system lines. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) identify and discuss the use of necessary tools. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Disk Brake Pad Replacement

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Disc Brake Pad Replacement
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace disc brake pads correctly.

TOOLS AND EQUIPMENT:	Overhead Projector Jack, safety stands, and fender covers Tire and wheel removal tools Necessary hand tools for caliper removal Appropriate shop manual Hand suction pump and container for brake fluid Mechanics stool 8-in. "C" Clamp
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The replacement of disc brake pads should be done when the safety clip begins to touch the metal. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review and discuss terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) identify tools and explain the use of each tool. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used for disc brake pad replacement.

THE NEXT LESSON IS: Service the Caliper and Disc

II-10-LP-7

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Brake and Bearing System

TOPIC: Service the Caliper and Disc

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to service the caliper and disc correctly.

TOOLS AND EQUIPMENT:

Fender cover
Hydraulic floor jack
Pliers
C-clamp
Two jack stands
Shop rag
Micrometer
Dial indicator

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-10-IS
II-10-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The caliper and disc should be serviced periodically to operate properly. Rebuilding the caliper and surfacing the disc will help return the system 'like-new' performance. By the end of this lesson, you will know how to do this.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, review discuss how to use tools.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the use of tools and procedures to service the caliper and disc. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology and procedures to service the caliper and disc.

THE NEXT LESSON IS: Reconditioning a Disc Brake Caliper

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Reconditioning a Disc Brake Caliper
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to recondition a disc brake caliper correctly.

TOOLS AND EQUIPMENT:	Appropriate tools for caliper removal Appropriate tools for wheel and tire removal Brake fluid and denatured alcohol Compressed air, hose and nozzle Clean shop towels and a flat metal pan 6-in. "C" Clamp Appropriate shop manual
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Reconditioning a disc brake caliper should be done carefully and safely. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, discuss terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the procedures to recondition a disc brake caliper. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-8 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Adjusting Park Brake

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Brake and Bearing System

TOPIC: Adjusting Park Brake

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to adjust the park brake correctly.

TOOLS AND EQUIPMENT:
Hydraulic floor jack
Two jack stands
Open-end wrenches

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-10-IS
II-10-JS-9

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The park brake should be adjusted carefully in order to hold the vehicle properly when engaged. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, discuss terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to adjust the park brake. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-9 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to adjust the park brake.

THE NEXT LESSON IS: Remove Wheel Bearings.

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT: Brake and Bearing System

TOPIC: Remove Wheel Bearings

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove wheel bearings correctly.

TOOLS AND EQUIPMENT:

- Shop rag
- Hydraulic floor jack
- Jack stand
- Large common screwdriver
- Pliers
- Box end wrench
- Hammer
- Brass or bronze bar for a race driver
- Glasses or shield

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-10-IS
II-10-JS-10

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When removing the wheel bearings, care should be taken not to let the bearings get dirty. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, discuss the proper use of tools.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) identify tools and the use of each to remove wheel bearings. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-10 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Clean, Inspect and Pack Bearings

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Clean, Inspect and Pack Bearings
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to clean, inspect and pack bearings correctly.

TOOLS AND EQUIPMENT:

- Overhead projector
- Shop rag
- Cleaning vat with cleaning fluid
- Brush
- Appropriate wheel bearing grease
- Removed wheel bearings
- Parts tray

MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-11

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When cleaning, inspecting and packing bearings, care must be taken to keep them clean and free of dirt. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, discuss the procedures and tools.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to clean, inspect and pack bearings. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-11 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to clean, inspect and pack bearings.

THE NEXT LESSON IS: Install Wheel Bearings

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Brake and Bearing System
TOPIC:	Install Wheel Bearings
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(1)(D)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss, service and replace components of drum, disc brake and bearing systems.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to install wheel bearings correctly.

TOOLS AND EQUIPMENT:	Hydraulic floor jack Jack stand Shop rag Side cutter pliers Box end wrench Rubber mallet New cotter pin Container of solvent Brush Brass bar for a race driver Hammer Auto manual Safety glasses
MATERIALS:	No special materials required
TEACHING AIDS:	No special teaching aids required
REFERENCES:	*General Mechanical Repair* II-10-IS II-10-JS-12

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To install wheel bearings, all parts must be cleaned first and then installed. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-10-IS as a guide, discuss tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) identify and explain use of each tool to install wheel bearings. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-10-JS-12 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Frame, Suspension and Steering

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Frame, Suspension and Steering
TOPIC:	Frame, Suspension and Steering
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify major steering and suspension components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to repair and replace parts of the steering and suspension system.

TOOLS AND EQUIPMENT:	Overhead projector	
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet	
REFERENCES:	*General Mechanical Repair*	
	II-11-IS	II-11-JS-2
	II-11-AS	II-11-JS-3
	II-11-JS-1	II-11-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The frame, suspension and steering are vital parts of the vehicle. By the end of the lesson, you will be familiar with the terminology.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-11-IS as a guide, discuss the terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology for frame, suspension and steering. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-11-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology for frame, suspension and steering.

THE NEXT LESSON IS: Remove and Replace Front Shock Absorber

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Frame, Suspension and Steering
TOPIC:	Remove and Replace Front Shock Absorber
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify major steering and suspension components.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace the front shock absorber correctly.

TOOLS AND EQUIPMENT:	Socket set	Hydraulic floor jack
	Combination wrenches	Two jack stands
	Box-end wrench set	Torque wrench
	Pry bar	Auto manual
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-11-IS II-11-JS-1	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to use safety procedures when removing and replacing the front shock absorber. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-11-IS as a guide, discuss terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate procedures to remove and replace the front shock absorber. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-11-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Remove and Replace Rear Shock Absorber

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Frame, Suspension and Steering

TOPIC: Remove and Replace Rear Shock Absorber

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify major steering and suspension components.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace the rear shock absorber correctly.

TOOLS AND EQUIPMENT:

- Socket set
- Box-end wrench set
- Pry bar
- Hydraulic floor jack
- Two jack stands
- Torque wrench
- Auto manual

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-11-IS
II-11-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to use safety procedures when removing and replacing rear shock absorbers. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-11-IS as a guide, review tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate procedures to remove and replace the rear shock absorber. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-11-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used to replace the rear shock absorber.

THE NEXT LESSON IS: Remove and Replace Tie Rod End

II-11-LP-3

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Frame, Suspension and Steering

TOPIC: Remove and Replace Tie Rod End

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify major steering and suspension components.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace the tie rod end correctly.

TOOLS AND EQUIPMENT:

- Ball peen hammer
- Two jack stands
- Needle nose pliers
- Safety glasses
- ⅜-in. drive socket set
- Pry bar
- Box-end wrench set
- Cotter pins
- Lug wrench
- Rubber mallet
- Tie rod end puller
- Hydraulic floor jack

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-11-IS
II-11-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When removing and replacing tie rod ends, it is essential to adjust the setting carefully because of steering. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-11-IS as a guide, discuss tools and terminology.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate with a display how to remove and replace the tie rod end. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-11-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to install the tie rod ends.

THE NEXT LESSON IS: Remove and Replace Idler Arm

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Frame, Suspension and Steering

TOPIC: Remove and Replace Idler Arm

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify major steering and suspension components.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace the idler arm correctly.

TOOLS AND EQUIPMENT:

- Socket set
- Box-end wrench set
- Ball peen hammer
- Hydraulic floor jack
- Two jack stands
- Torque wrench
- Grease gun
- Lug wrench
- Pry bar
- Tie rod end puller

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES: *General Mechanical Repair*
II-11-IS
II-11-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The removal and replacement of the idler arm should be done carefully because of the arm's link with the steering. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-11-IS as a guide, discuss the importance of the idler arm.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to remove the idler arm. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-11-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Drive Line

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Drive Line
TOPIC:	Drive Line
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to replace components of the drive line correctly.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-12-IS II-12-AS II-12-JS-1 II-12-JS-2 II-12-JS-3 II-12-JS-4 II-12-JS-5 II-12-JS-6 II-12-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The drive line is an important system that moves the vehicle. By the end of the lesson, you will be familiar with the terminology used with the drive line.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology used for the drive line. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology and procedures.

THE NEXT LESSON IS: Remove and Replace Speedometer Drive Gear

II-12-LP-1

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Drive Line	
TOPIC:	Remove and Replace Speedometer Drive Gear	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)	
TYPE OF LESSON:	Psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace a speedometer drive gear correctly.	
TOOLS AND EQUIPMENT:	Slip joint pliers Snap ring pliers Socket set	Hydraulic floor jack Two jack stands Creeper
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-12-IS II-12-JS-1	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Correct removal and replacement of the speedometer drive gear is essential to ensure the gears match and to register the correct speed. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain how to change the speedometer drive gear correctly. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any procedures to change the speedometer drive gear.

THE NEXT LESSON IS: Remove and Replace Drive Shaft

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Drive Line
TOPIC:	Remove and Replace Drive Shaft
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace the drive shaft correctly.

TOOLS AND EQUIPMENT:	Socket set Open-end wrench set Hydraulic floor jack	Two jack stands Masking tape
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* II-12-IS II-12-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When removing and replacing the drive shaft, care must be taken when universal joints are removed from the mounting. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss procedure to remove the drive shaft.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to keep the caps from coming off of the universal joint and discuss what would happen if the caps did come off. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Remove and Replace Universal Joint Cross and Roller Bearings

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Drive Line

TOPIC: Remove and Replace Universal Joint Cross and Roller Bearings

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace the universal joint cross and roller bearings correctly.

TOOLS AND EQUIPMENT:

Needle nose pliers
Common screwdriver
Socket set
Universal joint press
Ball peen hammer
Grease gun

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-12-IS
II-12-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The universal joint cross and roller bearings must be pushed from the yoke and then pressed back when the new one is installed. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss procedures to remove the universal joint from the yoke.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the procedures to install the universal joint in the yoke. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/ or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures and terminology to install the universal joint.

THE NEXT LESSON IS: Adjust Clutch Travel

II-12-LP-4

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Drive Line
TOPIC:	Adjust Clutch Travel
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to adjust the clutch travel correctly.

TOOLS AND EQUIPMENT:	Hydraulic floor jack Socket set Open-end wrench set Two jack stands Creeper
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-12-IS II-12-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The adjustment to set the clutch travel is important because it gets the manual transmission in gear. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss terminology and procedures to adjust the clutch travel.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) use a chalkboard to draw an adjustment, then show how the adjustment is made. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Remove and Replace Rear Transmission Support

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Drive Line
TOPIC:	Remove and Replace Rear Transmission Support
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify, adjust and replace parts of the drive line.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to remove and replace the rear transmission support correctly.

TOOLS AND EQUIPMENT:	Hydraulic floor jack Two jack stands Socket set Creeper New transmission support
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* II-12-IS II-12-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Be sure that vehicle is safely on jack stands and that proper tools are used when removing and replacing the rear transmission support. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss procedures to use.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the tools and equipment used to remove and replace the rear transmission support. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures used to replace the rear transmission support.

THE NEXT LESSON IS: Replace Rear Transmission Seal

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT: Drive Line

TOPIC: Replace Rear Transmission Seal

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace the rear transmission seal correctly.

TOOLS AND EQUIPMENT:

Hydraulic floor jack
Two jack stands
Creeper
Open-end wrench set
Rubber Mallet
Common screwdriver
Socket set
Masking tape
Rear transmission seal

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
II-12-IS
II-12-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To remove the rear transmission seal, first remove the driveshaft. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss terminology and tools to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) identify tools and explain their use in removing the rear transmission seal. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Remove and Replace Rear Axle Bearing

LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT: Drive Line

TOPIC: Remove and Replace Rear Axle Bearing

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(A), (ddd)(1)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify, adjust, and replace parts of the drive line.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace the rear axle bearing correctly.

TOOLS AND EQUIPMENT:

Socket set
Slide hammer puller
Hydraulic floor jack
Jack stand
New rear axle bearing
Lug wrench

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
II-12-IS
II-12-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To remove and replace the rear axle bearing, the wheel and tire must be removed first. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-12-IS as a guide, discuss tools and terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to remove the rear axle bearing. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-12-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Cleaning the Car

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Cleaning the Car
TOPIC:	Cleaning the Car
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify cleaning materials and equipment, clean interior and exterior of the car and wax surfaces.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to clean interior, exterior, upholstery, vacuum the interior and wax the exterior.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* II-13-IS II-13-AS II-13-JS-1 II-13-JS-2 II-13-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Cleaning the car is important to make the car look good, but also for better performance. By the end of the lesson, you will be familiar with the terminology and the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-13-IS as a guide, discuss terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures for cleaning the car. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-13-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology and procedures to clean the car.

THE NEXT LESSON IS: Washing the Car Exterior

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LESSON PLAN

MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Cleaning the Car
TOPIC:	Washing the Car Exterior
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify cleaning materials and equipment, clean interior and exterior of the car and wax surfaces.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to wash the car exterior correctly.

TOOLS AND EQUIPMENT:

- Bucket of warm water
- Mild detergent
- Water hose
- Sponge or rag
- Chamois or terry towel
- Window cleaner
- Paper towels

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
II-13-IS
II-13-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Wash the car carefully to avoid scratching the finish. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-13-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss and explain what would scratch the finish and what to do to prevent it. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-13-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures for washing the car exterior.

THE NEXT LESSON IS: Wax the Car Surface

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Cleaning the Car
TOPIC:	Wax the Car Surface
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify cleaning materials and equipment, clean interior and exterior of the car and wax surfaces.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to wax the car surface correctly.

TOOLS AND EQUIPMENT:	Car wax Applicator cloth	Polish cloth Chrome cleaner
MATERIALS:	No special materials required	
TEACHING AIDS:	No special teaching aids required	
REFERENCES:	*General Mechanical Repair* II-13-IS II-13-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Caution should be used when vehicle finish is waxed. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-13-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the proper way to wax the car surface. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-13-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to wax the car surface.

THE NEXT LESSON IS: Clean and Vacuum the Interior

II-13-LP-3

LESSON PLAN
MINOR AUTOMOTIVE MAINTENANCE

UNIT:	Cleaning the Car
TOPIC:	Clean and Vacuum the Interior
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(E), (ddd)(1)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify cleaning materials and equipment, clean interior and exterior of the car and wax surfaces.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to clean and vacuum the interior correctly.

TOOLS AND EQUIPMENT:	Clean cloth or rag Whisk broom Upholstery cleaner	Vacuum cleaner Spot remover
MATERIALS:	No special materials required	
TEACHING AIDS:	No special teaching aids required	
REFERENCES:	*General Mechanical Repair* II-13-IS II-13-JS-3	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Cleaning and vacuuming the vehicle's interior should be done carefully to prevent damage to any accessories. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using II-13-IS as a guide, discuss proper vacuuming of the vehicle interior.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain how to clean and vacuum the car's interior. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use II-13-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used with cleaning the vehicle interior.

THE NEXT LESSON IS: Next Unit: Small Engine Repair

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Engine Principles

TOPIC: Engine Parts and How They Work

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(B)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify and discuss the four-cycle and the two-cycle engine components and demonstrate the ability to show the difference between engines.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to explain the difference in the external and internal combustion engines and the components of the small engines.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES: *General Mechanical Repair*
III-1-IS
III-1-AS

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to understand engine parts and the operation of engines. By the end of the lesson, you will be familiar with the terminology to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-1-IS as a guide, discuss terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display various engine parts and identify and explain what each part is. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-1-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding engine procedures and terminology.

THE NEXT LESSON IS: Carburetors

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Principles of Carburetion
TOPIC:	Carburetors
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to explain the purpose and operation of the carburetion and fuel system, and service and repair the components correctly.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* III-2-IS III-2-AS III-2-JS-1 III-2-JS-2 III-2-JS-3 III-2-JS-4 III-2-JS-5 III-2-JS-6 III-2-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The carburetor is the main system of the engine: without it, no fuel will enter the engine. By the end of the lesson, you will be familiar with the terminology and procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss terminology used for carburetors.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display different type carburetors and identify them. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/ or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology and procedures for carburetors.

THE NEXT LESSON IS: Service on Air Cleaner

III-2-LP-1

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Principles of Carburetion

TOPIC: Service an Air Cleaner

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to service an air cleaner correctly.

TOOLS AND EQUIPMENT:

Overhead projector
Compressed air
Container of solvent and cleaning brush
Shop towels
Screwdriver
Clean engine oil
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES:

General Mechanical Repair
III-2-IS
III-2-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The air cleaner must be serviced and cleaned for the carburetor to mix the correct amount of air and fuel. By the end of the lesson, you will be familiar with the procedure to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss cleaning and servicing the air cleaner. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Remove and Replace a Float Type Carburetor

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Principles of Carburetion

TOPIC: Remove and Replace a Float Type Carburetor

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove and replace a float type carburetor correctly.

TOOLS AND EQUIPMENT:

Overhead projector
Open end wrenches
Hand tool assortment
Tubing wrenches
Torque wrench
Shop towels
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES:

General Mechanical Repair
III-2-IS
III-2-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Be sure to follow safety rules and use the right tools when you remove and replace the float type carburetor. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss proper way to remove and replace a float type carburetor. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and tools.

THE NEXT LESSON IS: Repair Leak in Steel Fuel Tank

III-2-LP-3

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Principles of Carburetion

TOPIC: Repair Leak in Steel Fuel Tank

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to repair a leak in a steel fuel tank correctly.

TOOLS AND EQUIPMENT:

- Open end wrenches
- Slot-head screwdriver
- Shop towels
- Cleaning solvent
- Solder gun
- 40-60 lead solder
- Fuel container
- Safety glasses
- Container large enough for gas tank
- Water to fill container
- Compressed air
- Spray paint

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
III-2-IS
III-2-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To repair a leak in a steel fuel tank, remove empty tank and soak tank in water to dispose of fumes. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss proper tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display, identify and explain the use of tools. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used to remove the steel tank.

THE NEXT LESSON IS: Replace Carburetor Diaphragm in a Pulsa-Jet Style with Automatic Choke

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Principles of Carburetion

TOPIC: Replace Carburetor Diaphragm in a Pulsa-Jet Style With Automatic Choke

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to replace the diaphragm in a pulsa-jet carburetor with an automatic choke correctly.

TOOLS AND EQUIPMENT:

Clean solvent
New O ring
Parts container
Gasoline
Phillips screwdriver
Flat tip screwdriver
Socket set
Feeler gauge
6-in. steel ruler
Shop towels

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
III-2-IS
III-2-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To replace a carburetor diaphragm in a pulsa-jet style with automatic choke, follow safety precautions a use the correct tools. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, review process to replace a carburetor diaphragm in a pulsa-jet carburetor.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the difference between a pulsa-jet and a float type carburetor. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Service a Two-Piece Flo-Jet Carburetor

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Principles of Carburetion
TOPIC:	Service a Two-Piece Flo-Jet Carburetor
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to service the two-piece flo-jet carburetor correctly.

TOOLS AND EQUIPMENT:	7/16-in., 1/2-in. combination open end wrench Cleaning pan with water Carburetor cleaner and basket Steel straightedge scale Iron bar Feeler gauge Phillips screwdriver Flat tip screwdriver Needle nose pliers Carburetor jet screwdriver Combination pliers Compressed air Safety glasses Carburetor repair kit Hose clamp pliers Parts container
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* III-2-IS III-2-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When servicing a two-piece flo-jet carburetor, be sure to use the proper tools. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss proper use of tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss proper use of tools and procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Test and Service a Fuel Pump

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Principles of Carburetion

TOPIC: Test and Service a Fuel Pump

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to test and service the fuel pump correctly.

TOOLS AND EQUIPMENT:

Open end wrenches
Shop towels
Hand tool assortment
Container to catch fuel
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:

General Mechanical Repair
III-2-IS
III-2-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To test and service a fuel pump, be sure to use the proper tools and work in a well ventilated area. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss procedures to test the fuel pump.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures used to test the fuel pump. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to test the fuel pump.

THE NEXT LESSON IS: Service Sediment Bowl Fuel Strainer

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Principles of Carburetion
TOPIC:	Service Sediment Bowl Fuel Strainer
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(C), (ddd)(2)(D)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to discuss the operation of the fuel system and repair each of its components correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to service the sediment bowl fuel strainer correctly.

TOOLS AND EQUIPMENT:	Hand tool assortment Cleaning solvent Pan for cleaning parts Shop towels	New gasket for glass bowl Safety glasses Pliers
MATERIALS:	No special materials required	
TEACHING AIDS:	No special teaching aids required	
REFERENCES:	*General Mechanical Repair* III-2-IS III-2-JS-7	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To service the sediment bowl fuel strainer, follow safety procedures. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-2-IS as a guide, discuss procedures to service the sediment bowl fuel strainer.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to service the sediment bowl fuel strainer. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-2-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and process of cleaning the strainer.

THE NEXT LESSON IS: Purpose of Lubrication Systems

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Lubrication Systems
TOPIC:	Purpose of Lubrication Systems
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(2)(A), (ddd)(2)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system properly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to explain the purpose and components of the lubrication system, and service it with correct oils and lubricant.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* III-3-IS III-3-JS-1 III-3-AS III-3-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The purpose of lubrication systems is to lubricate all engine parts for cooling and long life. By the end of the lesson, you will be familiar with the terminology and procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-3-IS as a guide, discuss types of oil selections.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) make a display and explain the different types of oil. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-3-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and terminology.

THE NEXT LESSON IS: Change Engine Oil

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Lubrication Systems
TOPIC:	Change Engine Oil
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(2)(A), (ddd)(2)(D)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system properly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to change the engine oil correctly.

TOOLS AND EQUIPMENT:

Oil
Drain pan
Wrench to fit drain plug
Oil can spout
Shop towels
Safety glasses
Operator's manual

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES:
General Mechanical Repair
III-3-IS
III-3-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When changing the engine oil, be sure to use the proper tools and oil type. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-3-IS as a guide, discuss procedures and tools.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to change engine oil. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-3-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to change engine oil properly.

THE NEXT LESSON IS: Service Crankcase Breather

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Lubrication Systems
TOPIC:	Service Crankcase Breather
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(2)(A), (ddd)(3)(D)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to inspect and service the lubrication system properly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to service the crankcase breather correctly.

TOOLS AND EQUIPMENT:	Hand tool assortment Clean towels Solvent Container for cleaning parts	New gasket Feeler gauge Safety glasses
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* III-3-IS III-3-JS-2	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When servicing the crankcase breather, be sure to use proper solvent, tools, and safety precautions. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-3-IS as a guide, discuss procedures and tools.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to clean the crankcase breather. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-3-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and tools used to service the crankcase breather.

THE NEXT LESSON IS: Starter Systems and Components

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Starter Systems
TOPIC:	Starter Systems and Components
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(D)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to remove and replace a starter, and identify and discuss components of the starter system.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to identify, remove, and service starters on small engines correctly.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* III-4-IS III-4-AS III-4-JS-1 III-4-JS-2 III-4-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The starter system and components are essential in starting the engine. By the end of the lesson, you will be familiar with terminology used with the starter system.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-4-IS as a guide, discuss terminology for starter systems.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display different starters and identify each type. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-4-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and terminology for starter systems.

THE NEXT LESSON IS: Disassemble, Test, Reassemble, and Replace a D.C. Starter

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Starter Systems

TOPIC: Remove, Disassemble, Test, Reassemble, and Replace a D.C. Starter

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to remove and replace a starter, and identify and discuss components of the starter system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove, service, and replace a D.C. starter correctly.

TOOLS AND EQUIPMENT:

- Hand tool assortment
- Armature grounder and test light
- Solvent and parts brush or rag
- Ignition wrench set
- Awl
- Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
III-4-IS
III-4-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When removing, servicing and replacing a D.C. starter, be sure to have proper tools and solvent cleaner. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-4-IS as a guide, discuss tools and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss testing and replacing the D.C. starter. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-4-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Replace Starter Rewind Spring

III-4-LP-2

LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Starter Systems

TOPIC: Replace Starter Rewind Spring

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to remove and replace a starter and identify and discuss components of the starter system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to remove, service and replace a starter rewind spring correctly.

TOOLS AND EQUIPMENT:

Hand tool assortment
Rope inserter
¾-in. square piece of square stock
New recoil spring
New starter rope
Small amount of grease
Cleaning solvent
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
III-4-IS
III-4-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To replace the starter rewind spring, certain procedures should be followed closely. By the end of the lesson, you will be familiar with what procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-4-IS as a guide, review terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to remove a starter rewind spring. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-4-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding tools and procedures to be used to replace a starter rewind spring.

THE NEXT LESSON IS: Service the Vertical Pull Starter

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LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Starter Systems

TOPIC: Service the Vertical Pull Starter

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to remove and replace a starter, and identify and discuss components of the starter system.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to service and replace the vertical pull starter correctly.

TOOLS AND EQUIPMENT:

New spring
New starter rope
Cleaning solvent
Safety glasses
Assortment of hand tools
Rope inserter tool
Safety gloves

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
III-4-IS
III-4-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When servicing the vertical pull starter, procedures and safety precautions should be followed. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-4-IS as a guide, discuss tools, safety, and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss proper use of tools and safety procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-4-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Measurement and Instruments

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Measurement Instruments
TOPIC:	Measurement and Instruments
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(B), (ddd)(2)(C), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use a micrometer, vernier caliper, dial indicator, telescoping gauge and other measuring instruments, and discuss the use of measuring instruments.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to measure and give correct dimensions of machined parts, and identify parts of measuring instruments.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* III-5-IS III-5-AS III-5-JS-1 III-5-JS-2 III-5-JS-3 III-5-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The use of measurement and instruments is very important to order to repair and rebuild motor parts and overhaul all engines. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-5-IS as a guide, discuss terminology for measurement and instruments.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display several instruments, and explain how the instrument is used and for what. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-5-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of measurement and instruments.

THE NEXT LESSON IS: Using a Vernier Caliper

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Measurement Instruments
TOPIC:	Using a Vernier Caliper
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use a micrometer, vernier caliper, dial indicator, telescoping gauge and other measuring instruments, and discuss the use of measuring instruments.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use a vernier caliper correctly.

TOOLS AND EQUIPMENT:	Vernier caliper Workpieces Assortment of fractional drill bits Assortment of letter size drill bits Assortment of machined parts
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* III-5-IS III-5-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Knowing how to use and handle all instruments is important. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-5-IS as a guide, discuss the use of the vernier caliper.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how the vernier caliper would be used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-5-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Using a Plain Micrometer

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Measurement Instruments
TOPIC:	Using a Plain Micrometer
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use a micrometer, vernier caliper, dial indicator, telescoping gauge and other measuring instruments, and discuss the use of measuring instruments.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use a plain micrometer correctly.

TOOLS AND EQUIPMENT:	Overhead projector Micrometers, plain a. 0-in. - 1.000-in. size b. 1.000-in. - 2.000-in. size Lathe or vise Workpieces a. New fractional drill bits, assortment of 5 b. New letter size drill bits, assortment of 5 c. Pieces of metal such as cold rolled stock, machined parts, hardened dowels; assortment of 5 **Note:** *All workpieces should be numbered or lettered for reference.*
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet and TM sheets
REFERENCES:	*General Mechanical Repair* III-5-IS III-5-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The use of a plain micrometer is important when measuring the parts of an engine. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-5-IS as a guide, discuss procedures to use a micrometer.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) identify parts and use of the micrometer. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-5-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use and care of the micrometer.

THE NEXT LESSON IS: Using a Dial Indicator

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Measurement Instruments
TOPIC:	Using a Dial Indicator
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use a micrometer, vernier caliper, dial indicator, telescoping gauge and other measuring instruments, and discuss the use of measuring instruments.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use a dial indicator correctly.

TOOLS AND EQUIPMENT:	Dial indicator Dial indicator holder Magnetic base Two V blocks Appropriate assortment of machined parts **Note:** *All workpieces should be numbered or lettered for reference.*
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* III-5-IS III-5-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Measuring with the dial indicator is important because accurate measurements are essential to engine repair. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-5-IS as a guide, discuss use of the dial indicators.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss with the class how the dial indicator could be used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-5-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used with the dial indicator.

THE NEXT LESSON IS: Using a Telescoping Gauge

III-5-LP-4

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Measurement Instruments
TOPIC:	Using a Telescoping Gauge
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use a micrometer, vernier caliper, dial indicator, telescoping gauge and other measuring instruments, and discuss the use of measuring instruments.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to use a telescoping gauge correctly.

TOOLS AND EQUIPMENT:	Micrometer Telescoping gauge Shop towels Safety glasses
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* III-5-IS III-5-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The telescoping gauge is used primarily for inside surface dimensions. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-5-IS as a guide, discuss how to use the telescoping gauge.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate and explain how to use a telescoping gauge. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-5-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the procedures to use the telescoping gauge.

THE NEXT LESSON IS: Troubleshooting

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Troubleshooting
TOPIC:	Troubleshooting
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(B), (ddd)(2)(C), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to define and discuss troubleshooting problems and how to repair them correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to define and describe how to troubleshoot and read a troubleshooting chart, and check the fuel, ignition and compression problems and repair them correctly.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* III-6-IS III-6-AS III-6-JS-1 III-6-JS-2 III-6-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Troubleshooting is very important and can save a considerable amount of time when engines and systems are repaired. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-6-IS as a guide, discuss basic terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss basic engine problems and how to repair them. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-6-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding terminology and procedures for troubleshooting.

THE NEXT LESSON IS: Troubleshooting the Fuel System

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LESSON PLAN
SMALL ENGINE REPAIR

UNIT: Troubleshooting

TOPIC: Troubleshooting the Fuel System

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(B), (ddd)(2)(C), (ddd)(2)(D), (ddd)(2)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to define and discuss troubleshooting problems and how to repair them correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to troubleshooting the fuel system correctly.

TOOLS AND EQUIPMENT:
Basic hand tool assortment
Appropriate service manual
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
III-6-IS
III-6-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Troubleshooting the fuel system will help save time on repairs and expenses for the customer. By the end of the lesson, you will be familiar with procedures to sue.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-6-IS as a guide, discuss procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss steps to use when troubleshooting the fuel system. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-6-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Troubleshooting the Ignition System

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Troubleshooting
TOPIC:	Troubleshooting the Ignition System
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(B), (ddd)(2)(C), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to define and discuss troubleshooting problems and how to repair them correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to troubleshoot the ignition system correctly.

TOOLS AND EQUIPMENT:	Basic hand tool assortment Test plug Appropriate service manual Safety glasses
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* III-6-IS III-6-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Troubleshooting the ignition system is an important step because the spark to ignite the fuel must take place before anything else happens. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-6-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss steps to troubleshoot the ignition system. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-1-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Troubleshooting Engine Compression

LESSON PLAN
SMALL ENGINE REPAIR

UNIT:	Troubleshooting
TOPIC:	Troubleshooting Engine Compression
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(2)(A), (ddd)(2)(B), (ddd)(2)(C), (ddd)(2)(D), (ddd)(2)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to define and discuss troubleshooting problems and how to repair them correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to troubleshoot engine compression correctly.

TOOLS AND EQUIPMENT:	Basic hand tool assortment Compression gauge Service manual Safety glasses
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* III-6-IS III-6-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Troubleshooting the engine compression is important because without compression the engine will not run. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using III-6-IS as a guide, discuss steps used in troubleshooting engine compression.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then

use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain procedures to be used with jack stands, and the purpose of location for jack stands. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use III-6-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problem which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Next Unit: Welding

LESSON PLAN
WELDING

UNIT:	Introduction to Welding
TOPIC:	Introduction to Oxyacetylene Welding
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to set up oxyacetylene equipment, light and adjust the welding torch, form a puddle, turn off the torch, and produce types of flames used in oxyacetylene welding.
TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* IV-1-IS IV-1-AS IV-1-JS-1 IV-1-JS-2 IV-1-JS-3 IV-1-JS-4 IV-1-JS-5 IV-1-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Introduction to oxyacetylene welding will help students learn the terminology needed. By the end of the lesson, you will be familiar with the terminology to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss terminology for oxyacetylene welding.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss tools used for oxyacetylene welding. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding tthe terminology and procedures for oxyacetylene welding.

THE NEXT LESSON IS: Set up Oxyacetylene Equipment for Welding

LESSON PLAN
WELDING

UNIT: Introduction to Welding

TOPIC: Set up Oxyacetylene Equipment for Welding

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to set up oxyacetylene equipment for welding correctly.

TOOLS AND EQUIPMENT:

1 Complete oxyacetylene welding unit
Gloves
Lighter
Goggles
Coveralls
Soapy water and brush
1 Proper open end wrench for brass fittings
Oxygen and acetylene cylinders
Dolly or cart

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-1-IS
IV-1-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is very important to understand how to set up oxyacetylene equipment in order to mix gases for welding. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss procedures to use.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the use of equipment. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occured while completing the job sheet.

THE NEXT LESSON IS: Turn on, Light, and Adjust the Welding Torch, Form a Weld Puddle, and Turn off the Torch

LESSON PLAN
WELDING

UNIT:	Introduction to Welding
TOPIC:	Turn on, Light, Adjust the Welding Torch, Form a Weld Puddle, and Turn off the Torch
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to turn on, light, and adjust the welding torch, form a weld puddle, and turn off the torch properly
TOOLS AND EQUIPMENT:	Complete oxyacetylene welding unit Gloves Lighter Goggles Coveralls Pliers Welding plate
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-1-IS IV-1-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

In order to set up the torch, use it to form a weld puddle, then turn off the torch properly, you need to be alert and safe. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss the opening and lighting of the oxyacetylene welding unit.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate procedures to set up the oxyacetylene welding unit. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to set regulators.

THE NEXT LESSON IS: Adjust Torch for Welding

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LESSON PLAN
WELDING

UNIT:	Introduction to Welding
TOPIC:	Adjust Torch for Welding
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to adjust torch for welding correctly.

TOOLS AND EQUIPMENT:

- Complete oxyacetylene welding unit
- Gloves
- Lighter
- Goggles
- Coveralls
- Pliers

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-1-IS
IV-1-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To adjust the torch for welding, be sure close attention is given to rates set on the acetylene valve. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss adjustment setting.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate procedure to set acyetelene valve. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occured while completing the job sheet.

THE NEXT LESSON IS: Make Weld Puddles with Different Torch Settings

LESSON PLAN
WELDING

UNIT: Introduction to Welding

TOPIC: Make Weld Puddles with Different Torch Settings

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make weld puddles with different torch settings correctly.

TOOLS AND EQUIPMENT:

1 Welding tip for welding 1/16-in. metal
Scrap 1/16-in. metal
Protective clothing
Ball peen hammer and anvil
Vise
Cooling vat
Goggles

MATERIALS: No special materials required

TEACHING AIDS: No special teaching aids required

REFERENCES: *General Mechanical Repair*
IV-1-IS
IV-1-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Welding with different torch settings to make weld puddles will require more concentration. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss the use of welding tips.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the purpose of different torch settings. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to use different torch settings.

THE NEXT LESSON IS: Lay Beads on Flat Plate with no Filler Rod

IV-1-LP-5

LESSON PLAN
WELDING

UNIT: Introduction to Welding

TOPIC: Lay Beads on Flat Plate with no Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay a bead on a flat plate with no filler rod correctly.

TOOLS AND EQUIPMENT:
Oxyacetylene welding unit
Welding gloves
Welding goggles
Pliers
Spark lighter
Flat plate steel workpiece selected by instructor

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-1-IS
IV-1-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to concentrate when laying beads on flat plate with no filler rod. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss procedures to use.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss how to select the proper tip size. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding regulator settings and proper tip sizes.

THE NEXT LESSON IS: Lay Beads on Flat Plate with a Filler Rod

IV-1-LP-6

LESSON PLAN
WELDING

UNIT: Introduction to Welding

TOPIC: Lay Beads on Flat Plate with a Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welding equipment and safely set up, light, adjust, and operate oxyacetylene welding equipment properly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay beads on flat plate with a filler rod correctly.

TOOLS AND EQUIPMENT:

Oxyacetylene welding unit
Welding gloves
Welding goggles
Pliers
Spark lighter
1 Flat plate steel workpiece selected by instructor
1 Mild steel rod as selected by instructor

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-1-IS
IV-1-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to be able to lay beads on the flat plate with a filler rod and use the correct angle while working. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-1-IS as a guide, discuss procedures to use.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display work that has been done and explain setting. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

UseIV-1-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding terminology and procedures.

THE NEXT LESSON IS: Oxyacetylene Positions and Applications

LESSON PLAN
WELDING

UNIT:	Oxyacetylene Welding Positions and Applications
TOPIC:	Oxyacetylene Positions and Applications
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to determine tip sizes and rod selection, use oxyacetylene welding in all positions, and understand the terms used in oxyacetylene welding.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* IV-2-IS IV-2-AS IV-2-JS-1 IV-2-JS-2 IV-2-JS-3 IV-2-JS-4 IV-2-JS-5 IV-2-JS-6 IV-2-JS-7 IV-2-JS-8 IV-2-JS-9 IV-2-JS-10 IV-2-JS-11

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The positions and applications of oxyacetylene welding and terminology used is important to welders. By the end of the lesson, you will be familiar with terminology and procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss terminology used.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display different welding positions and explain positions to be used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding terminology and procedures.

THE NEXT LESSON IS: Lay a Flange Weld without Filler Rod

LESSON PLAN
WELDING

UNIT: Oxyacetylene Welding Positions and Applications

TOPIC: Lay a Flange Weld without Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay a flange weld without filler rod correctly.

TOOLS AND EQUIPMENT:

Oxyacetylene welding unit
Fire brick table
Welder's gloves
Goggles
Pliers
Cooling vat
Wire brush
No. 1 welding tip
Spark lighter
Coveralls
Two pieces of 16-gauge metal (approximately 2 x 3-in)
Bend each into an L-shape down the 3-in. length with the flange being the same length on each

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-2-IS
IV-2-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To lay a flange weld without filler rod, the tools and equipment should be prepared and ready. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss procedures to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display tools and equipment and discuss the use of each tool. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to lay a flange weld without filler rod.

THE NEXT LESSON IS: Lay an Outside Corner Weld without Filler Rod

LESSON PLAN
WELDING

UNIT: Oxyacetylene Welding Positions and Applications

TOPIC: Lay an Outside Corner Weld without Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay an outside corner weld without filler rod correctly.

TOOLS AND EQUIPMENT:

Oxyacetylene welding unit
Fire brick table
Welder's gloves
Goggles
Pliers
Cooling vat
Wire brush
No. 1 welding tip
Spark lighter
Coveralls
Two pieces of 16-gauge mild steel plate (approx. 2 x 3-in.)

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-2-IS
IV-2-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Check the proper layout, direction of travel, and degrees for using the welding unit properly. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, review and discuss procedures to use.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss tools and equipment used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to lay an outside corner weld without filler rod.

THE NEXT LESSON IS: Lay a Flat Butt Weld with Proper Size Filler Rod

LESSON PLAN
WELDING

UNIT: Oxyacetylene Welding Positions and Applications

TOPIC: Lay a Flat Butt Weld with Proper Size Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay a flat butt weld with the proper size filler rod correctly.

TOOLS AND EQUIPMENT:

Oxyacetylene welding unit
Fire brick table
Welder's gloves
Goggles
Pliers
Cooling vat
Spark lighter
Wire brush
No. 1 welding tip
Coveralls
One piece of 16-gauge mild steel plate (approx. 4 x 6-in.)
1/16-in. filler rod (clothes hangers work as well)

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-2-IS
IV-2-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The proper size filler rod should be used to lay a flat butt weld properly. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss tools, equipment, and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) lay a flat butt weld, then explain how to complete it to the class. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Lay a Lap Weld with Filler Rod

LESSON PLAN
WELDING

UNIT: Oxyacetylene Welding Positions and Applications

TOPIC: Lay a Lap Weld with Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay a lap weld with filler rod correctly.

TOOLS AND EQUIPMENT:

- Oxyacetylene welding unit
- Fire brick table
- Welder's gloves
- Goggles
- Pliers
- Cooling vat
- Spark lighter
- Wire brush
- No. 1 welding tip
- Coveralls
- Two pieces of 16-gauge, 2 x 3-in. metal
- 1/16-in. filler rod (clothes hangers work as well)

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES: *General Mechanical Repair*
IV-2-IS
IV-2-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The torch and filler should be held at the proper degree of angle to lay a lap weld properly. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss tools, thickness of metals and sizes of filler rods to be used on different plate thicknesses. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems that may have occurred while completing the job sheet.

THE NEXT LESSON IS: Lay an Inside Corner Weld with Filler Rod

LESSON PLAN
WELDING

UNIT: Oxyacetylene Welding Positions and Applications

TOPIC: Lay an Inside Corner Weld with Filler Rod

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay an inside corner weld with filler rod correctly.

TOOLS AND EQUIPMENT:

Oxyacetylene welding unit
Fire Brick table
Welder's gloves
Goggles
Pliers
Cooling vat
Spark lighter
Wire brush
No. 1 welding tip
Coveralls
Two pieces of 16-gauge metal (approx. 2 x 3-in.)
1/16-in. filler rod (clothes hangers work as well)

MATERIALS: No special materials requried

TEACHING AIDS: Chalkboard

REFERENCES: *General Mechanical Repair*
IV-2-IS
IV-2-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When laying an inside corner weld with filler rod, plates should be positioned at the proper angle to be welded. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss proper positions and set-up.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the different welding positions. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Lay a Butt Joint without Filler Rod

LESSON PLAN
WELDING

UNIT:	Oxyacetylene Welding Positions and Applications
TOPIC:	Lay a Butt Joint without Filler Rod
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay a butt joint without filler rod correctly.

TOOLS AND EQUIPMENT:	Torch tip for welding 1⁄16-in. metal Scrap 1⁄16-in. metal Protective clothing Safety goggles
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-2-IS IV-2-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Laying a butt joint without filler rod takes more concentration so you do not over heat the metal and cause a melt-through. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss positions and applications.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) set up display of different positions to use and discuss how each was completed. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding positions and procedures to lay a butt joint without filler rod.

THE NEXT LESSON IS: Lay a Back Hand Butt Joint on Heavy Steel Plate

LESSON PLAN
WELDING

UNIT:	Oxyacetylene Welding Positions and Applications
TOPIC:	Lay a Back Hand Butt Joint on Heavy Steel Plate
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay a back hand butt joint on heavy steel plate correctly.

TOOLS AND EQUIPMENT

Welding tip for 1/4-in. plate
Two scrap plates 1/4-in. thick
1/8-in. filler rod
Protective clothing
Vise
Cooling vat
Safety goggles

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-2-IS
IV-2-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

While laying a back hand butt joint on heavy steel plate, first, plates should be tack welded to keep them from separating while completing the task. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss positions and applications.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) set up positions and explain the proper procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding proper positions and procedures.

THE NEXT LESSON IS: Lay a Beveled Butt Weld on Heavy Steel Plate

LESSON PLAN
WELDING

UNIT: Oxyacetylene Welding Positions and Applications

TOPIC: Lay a Beveled Butt Weld on Heavy Steel Plate

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay a beveled butt weld on a heavy steel plate correctly.

TOOLS AND EQUIPMENT:

Welding tip for 3/8-in. steel plate
Two scrap plates 3/8-in. thick
1/8-in. steel filler rod
Protective clothing
Bench or hand grinder
Hacksaw
Safety goggles

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-2-IS
IV-2-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Attention should be focused on proper preparation of heavy steel plate for a beveled butt weld. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss procedures and positions.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use

reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss how to prepare material for a beveled butt weld. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-8 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Backhand Weld a Beveled Butt Joint

499

LESSON PLAN
WELDING

UNIT:	Oxyacetylene Welding Positions and Applications	
TOPIC:	Backhand Weld a Beveled Butt Joint	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)	
TYPE OF LESSON:	Psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to backhand weld a beveled butt joint correctly.	
TOOLS AND EQUIPMENT:	Welding tip for 5/16-in. steel plate Two scrap plates 5/16-in. thick 3/16-in. filler rod	Protective clothing Bench or hand grinder Hacksaw Safety goggles
MATERIALS:	No special materaisl required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* IV-2-IS IV-2-JS-9	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The preparation of the metal for the beveled butt joint should be beveled at 60 degrees and leave proper thickness for a straight parallel root. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss preparation of metal for beveled welds.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display a correctly made beveled butt joint, and an incorrectly made butt joint and explain the difference. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-9 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheets.

THE NEXT LESSON IS: Braze a Butt Joint

LESSON PLAN
WELDING

UNIT:	Oxyacetylene Welding Positions and Applications
TOPIC:	Braze a Butt Joint
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to braze a butt joint correctly.

TOOLS AND EQUIPMENT:

Oxyacetylene welding unit
Fire brick table
Welder's gloves
Goggles
Pliers
Cooling vat
Wire brush
No. 1 welding tip
Spark lighter
Coveralls
Two pieces of 16-gauge metal (approx. 2 x 3-in.)
1/16-in. bronze filler rod
Welding flux

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-2-IS
IV-2-JS-10

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Brazing uses lower temperature, can join unlike metals, and can be used on light metals. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures used to braze a butt joint. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-10 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used to braze material.

THE NEXT LESSON IS: Braze Weld a Lap Joint in the Horizontal Position

LESSON PLAN
WELDING

UNIT:	Oxyacetylene Welding Positions and Applications	
TOPIC:	Braze Weld a Lap Joint in the Horizontal Position	
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B), (ddd)(3)(C)	
TYPE OF LESSON:	Psychomotor	
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make oxyacetylene welds and check them for defects correctly.	
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to braze weld a lap joint in the horizontal position correctly.	
TOOLS AND EQUIPMENT:	Oxyacetylene welding unit with brazing tip Welding goggles, safety glasses, and face shield Welding gloves Portable grinder Vise Pliers	Steel plates as selected by instructor Bronze rod as selected by instructor Flux as selected by instructor Fire brick work table Chipping hammer and wire brush
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* IV-2-IS IV-2-JS-11	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The brazing of joints in different positions is very beneficial, and they should be secured in place before starting. By the end of the lesson, you will be familiar with the procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-2-IS as a guide, discuss positions and applications

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display and discuss tools and equipment to use when brazing a lap joint in the horizontal position. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-2-JS-11 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problem which may have occurred while completing the job sheet.

THE NEXT LESSON IS: The Cutting Torch

LESSON PLAN
WELDING

UNIT: Using the Cutting Torch

TOPIC: The Cutting Torch

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to adjust, cut, and bevel with the oxyacetylene torch correctly.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES: *General Mechanical Repair*

IV-3-IS
IV-3-AS
IV-3-JS-1
IV-3-JS-2
IV-3-JS-3
IV-3-JS-4
IV-3-JS-5
IV-3-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The cutting torch is used to cut, weld, and bevel many metals when adjusted correctly. By the end of the lesson, you will be familiar with the terminology and procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss the terminology and procedures for using the cutting torch.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use

reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the terminology and procedures to use the cutting torch. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-3-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding terminology and procedures used with the cutting torch.

THE NEXT LESSON IS: Set up Equipment for Oxyacetylene Cutting

LESSON PLAN
WELDING

UNIT:	Using the Cutting Torch
TOPIC:	Set up Equipment for Oxyacetylene Cutting
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to set up equipment for oxyacetylene cutting correctly.

TOOLS AND EQUIPMENT:	Oxygen cylinder Acetylene cylinder Oxygen regulator Acetylene regulator Hoses and check valves Wrench Cylinder holder Torch body with tips Leak detector Goggles
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-3-IS IV-3-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The process of setting up oxyacetylene cutting equipment is very important and should be checked for safety. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss terminology and safety procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate safety procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-1-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to set up the cutting torch.

THE NEXT LESSON IS: Turn On, Light, Adjust, and Turn Off Oxyacetylene Cutting Torch

LESSON PLAN
WELDING

UNIT: Using the Cutting Torch

TOPIC: Turn on, Light, Adjust, and Turn off Oxyacetylene Cutting Torch

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to turn on, light, adjust. and turn off oxyacetylene cutting torch correctly.

TOOLS AND EQUIPMENT: Oxyacetylene welding unit with cutting torch attached
Protective clothing
Goggles or shield

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES: *General Mechanical Repair*
IV-3-IS
IV-3-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Use proper safety precautions and be aware of the way that the cutting torch should be turned on, adjusted and then turned off in the proper order. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use

reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to turn on, light, adjust, and turn off the oxyacetylene cutting torch. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-3-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures, pressures, and adjustments to use with the cutting torch.

THE NEXT LESSON IS: Lay Out Lines on a Piece of Metal and Cut with Cutting Torch at 90 Degree Angle

LESSON PLAN
WELDING

UNIT: Using the Cutting Torch

TOPIC: Lay Out Lines on a Piece of Metal and Cut with Cutting Torch at 90 Degree Angle

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to lay out lines on a piece of metal and cut with cutting torch at 90 degree angle correctly.

TOOLS AND EQUIPMENT:

Trysquare
Soapstone
Oxyacetylene welding unit
  with cutting torch attached
Pliers
Cooling vat
Chipping hammer
Tip cleaners
One piece of 1/4-in. steel plate
  (approximately 4 x 6-in.)
Protective clothing
Goggles

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-3-IS
IV-3-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The process of cutting out lines on a piece of metal with the torch at a 90 degree angle assures accuracy. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss procedures and importance of cutting lines.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate the process of cutting out lines. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-3-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Cut a Hole in Steel Plate

LESSON PLAN
WELDING

UNIT:	Using the Cutting Torch
TOPIC:	Cut a Hole in Steel Plate
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to cut a hole in a steel plate correctly.

TOOLS AND EQUIPMENT:

- Trysquare
- Soapstone
- Oxyacetylene welding unit
- Cutting table
- Welder's gloves
- Goggles
- Pliers
- Cooling vat
- Wire brush
- Cutting attachment (with No. 0 cutting tip)
- Spark lighter
- Coveralls
- Chipping hammer
- Wire cleaners
- Mild steel plate, 1/4 x 4 x 6-in.

MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-3-IS IV-3-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to be able to cut a hole in a steel plate at the proper place, and use the proper cutting equipment. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss procedures to use to cut a hole in a steel plate.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to cut a hole in a steel plate. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-3-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures to use when cutting a hole in a steel plate.

THE NEXT LESSON IS: Lay Out a Pattern on Mild Steel Plate and Cut Pattern to Specifications

LESSON PLAN
WELDING

UNIT:	Using the Cutting Torch
TOPIC:	Lay Out a Pattern on Mild Steel Plate and Cut Pattern to Specifications
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay out a pattern on a steel plate and cut out the pattern to given specifications correctly.

TOOLS AND EQUIPMENT:

Square and straightedge
Soapstone
Mild steel plate 1/4- to 1/2-in. thick, 6-in. square
Gloves
Safety goggles
Protective clothing
Pliers
Chipping hammer
Cutting equipment

MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-3-IS IV-3-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is an important skill to lay out and cut a pattern on a steel plate. By the end of the lesson, you will be able to lay out and cut a pattern in a steel plate to given specifications.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss why patterns are laid out on plates, then cut out.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) explain the reason for laying out a pattern on a steel plate to specifications. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-3-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Set up and Cut a Pipe Bevel by Hand

LESSON PLAN
WELDING

UNIT: Using the Cutting Torch

TOPIC: Set up and Cut a Pipe Bevel by Hand

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(B)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify parts of the cutting torch and problems resulting from improper use or adjustment of the cutting torch.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to set up and cut a pipe bevel correctly by hand.

TOOLS AND EQUIPMENT:

- Oxyacetylene cutting unit with tip
- Welding goggles
- Welding gloves
- Spark lighter
- Pliers
- Wraparound
- Soapstone marker
- Center punch (optional)
- Pipe with 3/16-in. wall thickness
- Tip wrench, if required
- File
- Wire brush

MATERIALS: No spcial materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-3-IS
IV-3-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To set up and cut a pipe bevel by hand, the pipe should be placed properly in a suitable working position and marked for a proper cut. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-3-IS as a guide, discuss safety and use of equipment.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedure to bevel cut a pipe by hand. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-3-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures used to cut a pipe bevel by hand.

THE NEXT LESSON IS: Shielded Metal Arc Welding

IV-4-LP

LESSON PLAN
WELDING

UNIT: Introduction to Shielded Metal Arc Welding

TOPIC: Shielded Metal Arc Welding

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(A), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to use welding equipment, make welds, and understand welding terminology and use it correctly.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES: *General Mechanical Repair*
IV-4-IS
IV-4-AS
IV-4-JS-1
IV-4-JS-2
IV-4-JS-3
IV-4-JS-4
IV-4-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

There are many opportunities in the field of shielded metal arc welding for those who are willing to work. By the end of the lesson, you will be familiar with the safety procedures.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-4-IS as a guide, discuss how important safety can be in shielded metal arc welding.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) list any additional safety procedures to be used. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-4-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the use of various safety procedures with shielded metal arc welding.

THE NEXT LESSON IS: Build a Pad on Mild Steel Plate in the Flat Position with E7018

LESSON PLAN
WELDING

UNIT: Introduction to Shielded Metal Arc Welding

TOPIC: Build a Pad on Mild Steel Plate in the Flat Position with E7018

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to build a pad on mild steel plate in the flat position with E7018 correctly.

TOOLS AND EQUIPMENT:
SMAW machine with accessories
Personal safety clothing and equipment
Pliers
Chipping hammer and wire brush
Fitter's hammer
Bench vise
Mild steel plates as selected by instructor
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-4-IS
IV-4-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Before laying a pad on a mild steel plate, the metal will need to be prepared, then the pad welded on to it. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-4-IS as a guide, discuss tools and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display tools and equipment then explain procedures for the task. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-4-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Weld to Specifications a Fillet Weld Lap Joint in the Flat Position with E6010

LESSON PLAN
WELDING

UNIT: Introduction to Shielded Metal Arc Welding

TOPIC: Weld to Specifications a Fillet Weld Lap Joint in the Flat Position with E6010

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to weld to specifications a fillet weld lap joint in the flat position with E6010 correctly.

TOOLS AND EQUIPMENT:
SMAW machine with accessories
Personal safety clothing and equipment
Pliers
Chipping hammer and wire brush
Fitter's hammer
Bench vise
Mild steel plates as selected by instructor
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-4-IS
IV-4-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to use the specifications necessary for the fillet weld lap joint in a flat position. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-4-IS as a guide, discuss positions and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) tell class why arc welding to specifications is important. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-4-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problem which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Weld to Specifications a Fillet Weld Lap Joint in the Flat Position with E7018

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LESSON PLAN
WELDING

UNIT:	Introduction to Shielded Metal Arc Welding
TOPIC:	Weld to Specifications a Fillet Weld Lap Joint in the Flat Position with E7018
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to weld to specifications a fillet weld lap joint in the flat position with E7018 correctly.

TOOLS AND EQUIPMENT:	SMAW machine with accessories Personal safety clothing and equipment Pliers Chipping hammer and wire brush Fitter's hammer Bench vise Mild steel plates as selected by instructor
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-4-IS IV-4-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Understanding the use of different electrodes and specifications to lay different type welds is important (as for a lap joint in different positions). By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-4-IS as a guide, discuss procedures and electrode codes.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the electrode code and use of letters and numbers. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-4-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Weld to Specifications a Fillet Weld Multi-Pass Tee Joint in the Flat Position with E7018

LESSON PLAN
WELDING

UNIT:	Introduction to Shielded Metal Arc Welding
TOPIC:	Weld to Specifications a Fillet Weld Multi-Pass Tee Joint in the Flat Position with E7018
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to weld to specifications a fillet weld multi-pass tee joint in the flat position with E7018 correctly.

TOOLS AND EQUIPMENT:	SMAW machine with accessories Personal safety clothing and equipment Pliers Chipping hammer and wire brush Fitter's hammer Bench vise Mild steel plates as selected by instructor Safety glasses
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-4-IS IV-4-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Using specifications given, make a fillet weld multi-pass tee joint in the flat position with the correct electrode E7018. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-4-IS as a guide, discuss safety requirements to be used.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display and discuss the types of electrodes with the class. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-4-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding specifications and their use in welding.

THE NEXT LESSON IS: Weld to Specifications a Fillet Weld Lap Joint in the Flat Position with E7024

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LESSON PLAN
WELDING

UNIT: Introduction to Shielded Metal Arc Welding

TOPIC: Weld to Specifications a Fillet Weld Lap Joint in the Flat Position with E7024

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to identify welders, welding equipment, types of welds, types of joints, different electrodes, the welding positions used in arc welding and proper safety.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to weld to specifications a fillet weld lap joint in the flat position with E7024 correctly.

TOOLS AND EQUIPMENT:
SMAW machine with accessories
Personal safety clothing and equipment
Pliers
Chipping hammer and wire brush
Fitter's hammer
Bench vise
Mild steel plates as selected by instructor
Safety glasses

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-4-IS
IV-4-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to be able to weld lap joints in several positions as well as the flat position. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-4-IS as a guide, discuss procedures and positions.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) set up metal plates to make a fillet weld lap joint in the flat position. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-4-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Welding Joints and Positions

IV-5-LP

LESSON PLAN
WELDING

UNIT:	Welding Joints and Positions
TOPIC:	Welding Joints and Positions
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Cognitive
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to prepare and lay a V-butt arc weld, run a continuous bead without breaking an arc, and weld in the various welding positions correctly.

TOOLS AND EQUIPMENT:	Overhead projector
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard, make transparencies from art in information sheet
REFERENCES:	*General Mechanical Repair* IV-5-IS IV-5-AS IV-5-JS-1 IV-5-JS-2 IV-5-JS-3 IV-5-JS-4 IV-5-JS-5 IV-5-JS-6 IV-5-JS-7 IV-5-JS-8 IV-5-JS-9 IV-5-JS-10 IV-5-JS-11 IV-5-JS-12

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

In the welding joints and positions, it is important to be able to lay a V-butt arc weld, and to run continuous beads without breaking an arc. By the end of the lesson, you will be familiar with terminology and procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss terminology and procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s), display different types of welding positions and welding joints. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology and procedures to use.

THE NEXT LESSON IS: Run a Stringer Bead

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Run a Stringer Bead

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to run a stringer bead correctly.

TOOLS AND EQUIPMENT:

An arc welder and accessories
Gloves
Helmet
Safety glasses
Chipping hammer
Wire brush
Pliers or vise grips
Mild steel plate—⅜ x 6 x 6-in.
⅛-in. E6013 electrodes
Coveralls
Soapstone and straightedge

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-5-IS
IV-5-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The stringer bead is always the first weld to be laid, and should be done carefully. By the end of this lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss procedures to run a stringer bead.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate and explain how to run a stringer bead. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures, tools, and equipment needed to run a stringer bead.

THE NEXT LESSON IS: Start, Stop, and Restart the Bead

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Start, Stop, and Restart the Bead

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to start, stop and restart the bead correctly.

TOOLS AND EQUIPMENT:

An arc welder and accessories
Welder's gloves
Helmet
Safety glasses
Chipping hammer
Wire brush
Pliers or vise grips
Mild steel plate—3/8 x 6 x 6-in.
1/8-in. E6013 electrodes
Coveralls

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-5-IS
IV-5-AS
IV-5-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

When starting, stopping and restarting the bead, the rate of travel should not be too fast or the bead will not be sufficent to hold. By the end of the lesson, you will be familiar with procedures to use

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TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss how to start, stop, and restart the bead correctly.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedure to start, stop, and restart the bead. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Make a Pad in the Flat Position

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Make a Pad in the Flat Position

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a pad in the flat position correctly.

TOOLS AND EQUIPMENT:

An arc welder and accessories
Welder's gloves
Helmet
Safety glasses
Chipping hammer
Wire brush
Pliers or vise grips
Mild steel plate—3/8 x 6 x 6-in.
1/8-in. E6013 electrodes
Coveralls
Cooling vat

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-5-IS
IV-5-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To make a pad in the flat position, the correct type metal, tools, equipment, and electrodes are necessary. By the end of this lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss tools and procedures to make a pad in the flat position.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to prepare a work station to make a pad in the flat position. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheets.

THE NEXT LESSON IS: Make a Pad in the Horizontal Position

IV-5-LP-4

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Make a Pad in the Horizontal Position

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a pad in a horizontal position correctly.

TOOLS AND EQUIPMENT:

An arc welder and accessories
Welder's gloves
Helmet
Safety glasses
Chipping hammer
Wire brush
Pliers or vise grips
Mild steel plate—3/8 x 6 x 6-in.
1/8-in. E6011 electrodes
Coveralls
Cooling vat

MATERIALS: No spcial materias required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-5-IS
IV-5-AS
IV-5-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Making a pad in horizontal position is important in order to be aware of different positions needed to do welding jobs. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss use of pads and different positions to use.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) disscuss procedures to make a pad in the horizontal position. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and positions to use.

THE NEXT LESSON IS: Make a Pad in the Vertical Position

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Make a Pad in the Vertical-Up Position

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a pad in the vertical-up position correctly.

TOOLS AND EQUIPMENT:

An arc welder and accessories
Welder's gloves
Helmet
Safety glasses
Chipping hammer
Wire brush
Pliers or vise grips
Mild steel plate—3/8 x 6 x 6-in.
1/8-in. E6011 electrodes
Coveralls
Cooling vat

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-5-IS
IV-5-JS-5

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The vertical position is a different type position in which to make a pad. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss procedures and terminology.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss overlapping of beads, and the purpose of direction of travel. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-5 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the jobsheet.

THE NEXT LESSON IS: Make a V-Butt Weld

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Make a V-Butt Weld

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a V-butt weld correctly.

TOOLS AND EQUIPMENT:

- An arc welder and accessories
- Welder's gloves
- Helmet
- Safety glasses
- Chipping hammer
- Wire brush
- Pliers or vise grips
- Mild steel plate—Two 3/8 x 6 x 6-in. beveled plates
- 5/32-in. E6011 electrodes
- Coveralls

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-5-IS
IV-5-JS-6

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to understand procedures to make a V-butt weld and the reason for using tack welds. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss safety procedures and explain the use of each tool needed to complete the job. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-6 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Make a Single Pass Lap Joint

LESSON PLAN
WELDING

UNIT: Welding Joints and Positons

TOPIC: Make a Single Pass Lap Joint

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a single pass lap joint correctly.

TOOLS AND EQUIPMENT:

- An arc welder and accessories
- Welder's gloves
- Helmet
- Safety glasses
- Chipping hammer
- Wire brush
- Pliers or vise grips
- Mild steel plate—Twp 3⁄8 x 3 x 6-in. plates
- 5⁄32-in. E6011 electrodes
- Coveralls

MATERIALS: No special materials required

TEACHING AIDS: Chalkload

REFERENCES:
General Mechanical Repair
IV-5-IS
IV-5-JS-7

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

In order to make the single pass lap joint, the steel plates need to be placed in the proper position and set to be tack welded before making a single pass. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss terminology and positions.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to make a single pass lap joint. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-7 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding positions and types of welding joints.

THE NEXT LESSON IS:Make a Single Pass Fillet Weld

LESSON PLAN
WELDING

UNIT: Welding Joints and Positions

TOPIC: Make a Single Pass Fillet Weld

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive, psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a single pass fill weld correctly

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TOOLS AND EQUIPMENT:

- An arc welder and accessories
- Welder's gloves
- Helmet
- Safety glasses
- Chipping hammer
- Wire brush
- Pliers or vise grips
- Mild steel plate—Two $\frac{3}{8}$ x 3 x 6-in. plates
- $\frac{5}{32}$-in. E6011 electrodes
- Coveralls

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:
General Mechanical Repair
IV-5-IS
IV-5-JS-8

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

To make a single pass fillet weld, the two pieces of metal have to be in the proper position. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to make a single pass fillet weld. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-8 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and positions to make a fillet weld.

THE NEXT LESSON IS: Make a Multiple Pass Fillet Weld

IV-5-LP-9

LESSON PLAN
WELDING

UNIT:	Welding Joints and Positions
TOPIC:	Make a Multiple Pass Fillet Weld
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Cognitive, psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to make a multiple pass fillet weld correctly.

TOOLS AND EQUIPMENT:	An arc welder and accessories Welder's gloves Helmet Safety glasses Chipping hammer Wire brush	Pliers or vise grips Mile steel plate—Two 3⁄8 x 3 x 6-in. plates 5⁄32-in. E6011 electrodes Coveralls
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* IV-5-IS IV-5-JS-9	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

It is important to position metal plates correctly to make a multiple pass weld. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss procedures to make a multiple pass fillet weld.

   MONITOR AND ADJUST:

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate how to make a multiple pass fillet weld. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-9 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Make a Lap Joint Using Weave Pattern

LESSON PLAN
WELDING

UNIT: Welding Joints and Positons

TOPIC: Make a Lap Joint Using Weave Pattern

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Psychomotor

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to make a lap joint using the weave pattern correctly.

TOOLS AND EQUIPMENT:

An arc welder and accessories
Welder's gloves
Helmet
Safety glasses
Chipping hammer
Wire brush
Pliers or vise grips
Mild steel plate—Two 3/8 x 3 x 6-in. plates
5/32-in. E6011 electrodes
Coveralls

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard

REFERENCES:

General Mechanical Repair
IV-5-IS
IV-5-JS-10

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Making a lap joint using the weavew pattern is another important procedure to use. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss procedures to use with a weave pattern

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate proper procedure to make a lap joint using the weave pattern. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-10 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures using the weave pattern to weld.

THE NEXT LESSON IS: Make a Fillet Weld Using Weave Pattern

LESSON PLAN
WELDING

UNIT:	Welding Joints and Postions
TOPIC:	Make a Fillet Weld Using Weave Pattern
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to make a fillet weld using the weave pattern correctly.

TOOLS AND EQUIPMENT:	An arc welder and accessories Welder's gloves Helmet Safety glasses Chipping hammer Wire brush Pliers or vise grips Mild steel plate—Two 3/8 x 3 x 6-in. plates 5/32-in. E6011 electrodes Coveralls
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-5-IS IV-5-JS-11

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Using the weave pattern to make a fillet weld will halp keep metal from burning away or undercutting. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guid, discuss safety and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the procedures to use a weave pattern for a fillet weld. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-11 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding

THE NEXT LESSON IS: Lay a Vertical-Down Stringer Bead

LESSON PLAN
WELDING

UNIT:	Welding Joints and Positions
TOPIC:	Lay a Vertical-Down Stringer Bead
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(D), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to use the correct welding terminology in pointing out the factors involved in producing a quality arc weld.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay a vertical-down stringer bead correctly.

TOOLS AND EQUIPMENT:	An arc welder and accessories Welder's gloves Helmet Safety glasses Chipping hammer	Wire brush Pliers or vise grips Mild steel plate—3/8 x 6 x 6-in. 1/8-in. E6013 electrode Coveralls
MATERIALS:	No special materials required	
TEACHING AIDS:	Chalkboard	
REFERENCES:	*General Mechanical Repair* IV-5-IS IV-5-AS IV-5-JS-12	

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The vertical-down position stringer head is a necessary welding position. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-5-IS as a guide, discuss terminology and procedures.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) demonstrate and explain the procedures to make a vertical-down stringer bead. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-5-JS-12 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding

THE NEXT LESSON IS: MIG Welding

LESSON PLAN
WELDING

UNIT: MIG Welding

TOPIC: MIG Welding

ESSENTIAL ELEMENT(S): (a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(3)(D), (ddd)(3)(E)

TYPE OF LESSON: Cognitive

UNIT OBJECTIVE: After completing this unit, the student(s) will be able to make metallic inert-gas (MIG) welded joints.

SPECIFIC OBJECTIVE(S): After completing this lesson, the student(s) will be able to identify terms used with MIG welding, identify and use types of filler wire and MIG weld correctly.

TOOLS AND EQUIPMENT: Overhead projector

MATERIALS: No special materials required

TEACHING AIDS: Chalkboard, make transparencies from art in information sheet

REFERENCES: *General Mechanical Repair*
IV-6-IS
IV-6-AS
IV-6-JS-1
IV-6-JS-2
IV-6-JS-3
IV-6-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The term MIG welding is a term used for gas metal arc welding that uses types of filler wire to weld. By the end of the lesson, you will be familiar with the terminology and procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-6-IS as a guide, discuss terminology.

MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss MIG terminology and procedures. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-6-AS as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding the terminology and procedures to use.

THE NEXT LESSON IS: Make a MIG Welding Bead

LESSON PLAN
WELDING

UNIT:	MIG Welding
TOPIC:	Making a MIG Welding Bead
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make metallic inert-gas (MIG) welded joints.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to make MIG welding bead correctly.

TOOLS AND EQUIPMENT:	MIG welding equipment 12-gauge weld steel, 6 x 6-in. .035-in. electrode wire CO_2 shielding gas Side cutting pliers Spatter release spray Protective clothing
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-6-IS IV-6-JS-1

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The process of making a MIG welding bead is different in the sense that CO_2 shielding gas and wire are used to weld. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-6-IS as a guide, discuss procedures and use of shielding gas.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) display tools and equipment used with MIG welding and explain the use of each. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-6-JS-1 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided.Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Lay a Single-Pass Butt Weld

LESSON PLAN
WELDING

UNIT:	MIG Welding
TOPIC:	Lay a Single-Pass Butt Weld
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make metallic inert-gas (MIG) welded joints.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay a single-pass butt weld correctly.
TOOLS AND EQUIPMENT:	MIG welding equipment ⅛-in. mild steel (2 pieces) 3 x 6-in. .035-in. electrode wire CO_2 shielding gas Side cutting pliers Spatter release spray Protective clothing
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-6-IS IV-6-JS-2

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The setup to lay a single-pass butt weld should be observed closely, and students should be aware of the different tools, equipment and processes used in MIG welding. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-6-IS as a guide, discuss use of MIG welding equipment.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures to lay a single-pass butt weld. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-6-JS-2 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing the job sheet.

THE NEXT LESSON IS: Lay a Single-Pass Lap Joint

LESSON PLAN
WELDING

UNIT:	MIG Welding
TOPIC:	Lay a Single-Pass Lap Joint
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make metallic inert-gas (MIG) welded joints.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay a single-pass lap joint correctly.

TOOLS AND EQUIPMENT:	MIG welding equipment ⅛-in. mild steel (2 pieces) 3 x 6-in. .035-in. electrode wire CO_2 shielding gas Side cutting pliers Spatter release spray Protective clothing Cooling vat
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-6-IS IV-6-JS-3

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

The process of laying a single-pass lap joint is similar to previous positions and applications used. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-6-IS as a guide, discuss procedures.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented.If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss the proper settings for a MIG welder to make a single-pass lap joint. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-6-JS-3 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding procedures and positions.

THE NEXT LESSON IS: Lay a Tee Weld Joint

LESSON PLAN
WELDING

UNIT:	MIG Welding
TOPIC:	Lay a Tee Weld Joint
ESSENTIAL ELEMENT(S):	(a)(4), (a)(7)(A), (a)(7)(B), (a)(7)(C), (a)(7)(D), (a)(7)(E), (ddd)(3)(D), (ddd)(3)(E)
TYPE OF LESSON:	Psychomotor
UNIT OBJECTIVE:	After completing this unit, the student(s) will be able to make metallic inert-gas (MIG) welded joints.
SPECIFIC OBJECTIVE(S):	After completing this lesson, the student(s) will be able to lay a tee weld joint correctly.

TOOLS AND EQUIPMENT:	MIG welding equipment 1/8-in. mild steel (2 pieces) 3 x 6-in. .035-in. electrode wire CO_2 shielding gas Side cutting pliers Spatter release spray Protective clothing Cooling vat
MATERIALS:	No special materials required
TEACHING AIDS:	Chalkboard
REFERENCES:	*General Mechanical Repair* IV-6-IS IV-6-JS-4

INTRODUCTION/MOTIVATION/WARM-UP (Focus/direct student's attention to the content/purpose of instruction/activity)

Be sure, when you lay a tee weld joint, that metal plates are in position and ready. By the end of the lesson, you will be familiar with procedures to use.

TEACHER ACTIVITIES (Presentation, demonstration, lecture, modeling, audio/visuals, check for knowledge, and reteach/extension, explanation, and guided practice)

1. Using IV-6-IS as a guide, discuss procedures and terminology.

   MONITOR AND ADJUST: Make sure the students are following or comprehending what is being presented. If the students are not perceiving the subject matter, then use reteach activities. If the students are perceiving the subject matter, then use extension activities.

   RETEACH ACTIVITIES: Teach the same material using either different methods or employ the technique of individualized instruction.

   EXTENSION ACTIVITIES: Extend the learning for the student(s). Have student(s) discuss procedures used to lay a tee weld joint. In addition, you may continue to the next subtopic or use related magazines, books, pictures, computer software, videos, etc.

STUDENT ACTIVITIES (Application, independent practice)

Use IV-6-JS-4 as independent practice.

EVALUATION/VERIFICATION

An informal evaluation of student learning may be done through scoring of assignment sheet, and/or by observing students as they complete job sheets.

SUMMARY/CLOSURE

Review information provided. Ask questions regarding any problems which may have occurred while completing job sheets.

APPENDIX A

ANSWERS TO ASSIGNMENT SHEETS

ANSWERS TO ASSIGNMENT SHEETS

SECTION II

MINOR AUTOMOTIVE MAINTENANCE

II-1-AS

1. 1. Safety: Minimizing harm and risk in the workplace to eliminate accidents.
   2. Personal safety: Protecting yourself from injury caused by your own or another worker's actions.
   3. Group safety: Protecting other workers from hazardous situations caused by neglect, abuse, or ignorance.

2. a, b, c

3. a. yourself
   b. unsafe
   c. protecting

4. Any four of these is acceptable:

   1. Horseplay
   2. Inadequate lighting
   3. Undesirable location of equipment
   4. Low ceilings
   5. Unguarded belts, gears, pulleys, blades, cutters, etc.
   6. Failure to allow for adequate safety zones around equipment
   7. Improper type and location of switches
   8. Poorly located, constructed, and maintained storage
   9. Waste materials, stock supplies, or liquids on the floor
   10. Improperly maintained tools and equipment
   11. Improper use of tools and equipment
   12. Failure to use protective equipment (Safety glasses are a must)
   13. Inadequate ventilated work areas
   14. Failure to adhere to personal grooming standards as related to the operation of equipment and/or the use of tools.
       Examples: Loose clothing: dangling jewelry; long, loose hair
   15. Use of alcohol or drugs by workers

5. a. False
    b. True
    c. False
    d. False

6. a. False
    b. True
    c. False
    d. True
    e. False
    f. False
    g. False
    h. True
    i. False

7. a. True
    b. True
    c. False
    d. False
    e. True
    f. False
    g. True
    h. True
    i. False
    j. True
    k. False
    l. True

8. a. a jack and jack stands
    b. in a secure position
    c. adequate lighting
    d. slowly

II-2-AS

1. The purpose of the combustion engine is to convert raw materials such as gasoline into mechanical power to do the many work-related jobs needed by man.

2. a. A device used to burn raw materials within itself
    b. A device used to accept the pressure of raw materials being burned in another source and then introduced into the engine

3. a. 3
b. 1
c. 2
d. 4
e. 7
f. 5
g. 6
h. 9
i. 10
j. 8
k. 6
l. 10
m. 11
n. 12
o. 13
p. 14
q. 10
r. 12
s. 11
t. 9
u. 8
v. 13
w. 14
x. 4
y. 11

4. a. —
b. 2
c. 5
d. 7
e. 4
f. 6
g. 1
h. 3

5. a. 1
b. 2
c. 3

6. a. yes
b. no
c. yes
d. yes
e. no

7. b, d, e

8. a. 2
b. 4
c. 3
d. 1

9. a. 2
b. 1
c. 4
d. 5
e. 3

10. a. 4
b. 3
c. 2
d. 1

1. The purpose of the automotive fuel system is to store, transfer, and mix fuel and air for proper engine operation.

2. a. 2
   b. 3
   c. 1
   d. 4

3. a. fuel
   b. baffles
   c. expand
   d. filler opening
   e. amount

4. a. True
   b. False
   c. True

5. a. sends it to
   b. diaphragm
   c. camshaft

6. a. 1, 4, 5
   b. 2

7. a. air
   b. air, fuel
   c. 1, 3, 4

II-4-AS

1. 1. Cranking the engine

   2. Ignition

   3. Lighting and signaling

   4. Gauges and warning lights

2. a. 9
   b. 7
   c. 5
   d. 3
   e. 2
   f. 8
   g. 4
   h. 6
   i. 1
   j. 13
   k. 12
   l. 10
   m. 11
   n. 14

3. a. 3
   b. 1
   c. 2

4. a. Direct current
   b. Alternating current

5. a. Series
   b. Parallel

6. a. Positive post
   b. Electrolyte
   c. Cells
   d. Negative post

II-5-AS

1. The purpose of the ignition system is to supply and distribute high-voltage sparks that ignite the fuel-air mixture within the combustion chamber.

2. a. 4
   b. 8
   c. 11
   d. 5
   e. 13
   f. 9
   g. 12
   h. 7
   i. 2
   j. 10
   k. 1
   l. 6
   m. 3

3. a. 2
   b. 5
   c. 4
   d. 7
   e. 1
   f. 6
   g 3

4. a. 6
   b 5
   c. 3
   d. 1
   e. 2
   f. 4

5. a. 5
   b. 4
   c. 6
   d. 2
   e. 3
   f. 1
   g. 7

6. a. 4
   b. 2
   c. 1
   d. 3

II-6-AS

1. The purpose of the lubrication system is to reduce friction throughout the automobile by means of oil, or grease, making the automobile a more economical, longer-lasting vehicle.

2. a. 4
   b. 1
   c. 6
   d. 13
   e. 7
   f. 12
   g. 9
   h. 8
   i. 5
   j. 11
   k. 2
   l. 10
   m. 3

3. a, c, e, f, g

4. a. Canister type
   b. Spin-on

5. b, c, e

6. a. yes
   b. yes
   c. no
   d. yes
   e. yes
   f. yes
   g. no

7. a. 3
   b. 1
   c. 2
   d. 4

II-7-AS

1. The purpose of the cooling system is to relieve heat generated by explosion in the engine by transferring the heat to the water in the water jackets running through the block, and then transporting it through the hoses to the radiator where it leaves the system by air being drawn through the radiator by the fan.

2. a. yes
   b. no
   c. yes
   d. no
   e. yes

3. a. 6
   b. 3
   c. 8
   d. 7
   e. 9
   f. 5
   g. 2
   h. 4
   i. 1

4. a. bellows
   b. pellet

5. a. permanent, replaceable
   b. lower
   c. ethylene glycol
   d. poisonous
   e. 24 months
   f. will

II-8-AS

1. The purpose of the exhaust system is to transfer the burned gases from the combustion chamber to the atmosphere and reduce the exhaust noise to an acceptable level.

2. a. 4
   b. 5
   c. 1
   d. 6
   e. 3
   f. 2

3. a. 4
   b. 3
   c. 1
   d. 5
   c. 2

4. a. 2
   b. 7
   c. 3
   d. 6
   e. 1
   f. 5
   g. 8
   h. 4

II-9-AS

1. a. 1
   b. 2
   c. 6
   d. 5
   e. 3
   f. 8
   g. 4
   h. 9
   i. 7

2. c, e, f, h, i

3. a. Dents
   b. Cracks
   c. Excessive wear in bolt holes
   d. Burrs
   e. Warpage

4. a. Excessive cornering speed
   b. Incorrect camber adjustment
   c. Incorrect toe-in or toe-out adjustment
   d. Under inflation
   e. Over inflation

5. Patch

6. To make the set of tires wear evenly and increase tread life.

II-10-AS

1. The purpose of the brake system is to transmit hydraulic pressure to wheel cylinders or calipers, which produces friction between the brake and rotor or drum, and causes the automobile to slow or stop.

2. a. 9
   b. 1
   c. 12
   d. 10
   e. 11
   f. 3
   g. 5
   h. 6
   i. 4
   j. 2
   k. 8
   l. 7

3. a. Brake lining
   b. Brake shoe
   c. Piston
   d. Cup
   e. Wheel cylinder

4. a. Primary shoe
   b. Lever return spring
   c. Primary return spring
   d. Adjusting lever
   e. Anchor pin plate
   f. Wheel cylinder assembly
   g. Retainer
   h. Spring
   i. Secondary return spring
   j. Adjusting cable
   k. Secondary shoe
   l. Hold down pin
   m. Backing plate
   n. Hole covers

5. a. Retainer
   b. Reservoir cover
   c. Reservoir seal
   d. Master cylinder casting
   e. Rear piston assembly
   f. Vent seal
   g. Vent seal retainer
   h. Snap ring
   i. Secondary seals
   j. Floating piston
   k. Protector washer
   l. Primary seal
   m. Floating piston spring
   n. Floating piston stop bolt
   o. O-ring
   p. Check valves
   q. Tube seat inserts
   r. Check valve springs

6. a. 3
   b. 16
   c. 6
   d. 11
   e. 15
   f. 2, 7
   g. 12
   h. 4, 10
   i. 13
   j. 4
   k. 5
   l. 4, 10, 9
   m. 14

II-11-AS

1. a. 3
   b. 1
   c. 5
   d. 6
   e. 4
   f. 2
   g. 11
   h. 7
   i. 13
   j. 8
   k. 12
   l. 9
   m. 14
   n. 10
   o. 16
   p. 15
   q. 17

2 a. integral type
b. conventional

3. a. Solid axle leaf spring suspension
b. Independent coil spring suspension

4. a, d

5. a. Upper control arm
b. Shock absorber
c. Coil spring
d. Lower control arm
e. Lower ball joint
f. Steering knuckle
g. Upper ball joint

6. a. Pitman arm
b. Tie rod
c. Idler arm support
d. Idler arm
e. Center link
f. Adjustment sleeve

7. a. Coil spring
b. Single leaf spring
c. Multi-leaf spring
d. Torsion bar spring

8. a. Telescopic
b. Superlift
c. Air adjustable
d. Strut

II-12-AS

1. a. 2
b. 6
c. 5
d. 1
e. 3
f. 4
g. 7
h. 8
i. 11
j. 10
k. 9

2. a. Universal joint
b. Propeller shaft
c. Transmission
d. Differential

3. a. Flywheel
b. Pressure plate assembly
c. Throw-out bearing
d. Clutch fork
e. Bell housing

4. a. 3
b. second
c. the same as
d. 3.5 to 1

II-13-AS

1. F
2. T
3. F
4. T
5. T
6. F
7. F
8. T
9. F
10. F
11. T
12. F
13. T
14. T
15. T

ANSWERS TO ASSIGNMENT SHEETS
SECTION III
SMALL ENGINE REPAIR

III-1-AS

1. The purpose of the combustion engine is to convert raw materials such as gasoline into mechanical power to do the many work-related jobs needed by man.

2. a. A device used to burn raw materials within itself
   b. A device used to accept the pressure of raw materials being burned in another source and then introduced into the engine

3. a. 3
   b. 1
   c. 2
   d. 4
   e. 7
   f. 5
   g. 6
   h. 9
   i. 10
   j. 8
   k. 6
   l. 15
   m. 11
   n. 12
   o. 13
   p. 18
   q. 10
   r. 12
   s. 11
   t. 9
   u. 8
   v. 13
   w. 18
   x. 4
   y. 11

4. a. —
   b. 2
   c. 5
   d. 7
   e. 4
   f. 6
   g. 1
   h. 3

5. a. 1
   b. 2
   c. 3

6. a. yes
   b. no
   c. yes
   d. yes
   e. no

7. b, d, e

8. a. 2
   b. 4
   c. 3
   d. 1

9. a. 1
   b. 2
   c. 3
   d. 4
   e. 5

10. a. 4
    b. 3
    c. 2
    d. 1

III-2-AS

1. The fuel system supplies a combustable mixture of air and fuel vapor to the engine cylinders.

2. a. Gravity feed
   b. Suction feed
   c. Pump feed

3. Float and diaphragm

4. The venturi is the section of the carburetor that is constricted, or has a smaller cross section area for air to flow through.

5. It controls the amount of gasoline that is available to the carburetor.

6. a. 2
   b. 5
   c. 3
   d. 1
   e. 4

7. Carburetor

8. The diaphragm carburetor will work at any angle or position.

9. The purpose is to produce an extremely rich mixture of fuel for easy starting.

10. The throttle controls the engine speed by controlling the amount of fuel mixture entering the combustion chamber.

11. Air vane, mechanical governor

12.

Air vane	Mechanical
1. a	1. e
2. c	2. c
3. b	3. a
4. d	4. f
5. e	5. d
	6. b

III-3-AS

1. a. 4
   b. 1
   c. 3
   d. 2
   e. 7
   f. 5
   g. 6
   h. 8
   i. 9
   j. 10

2. b

3. a. Friction
   b. Cools or cushions
   c. Cylinders
   d. Clean

4. By using premix lubrication

5. Are printed on the side of the oil can

6. a. temperatures
   b. 0
   c. higher number
   d. viscosity

7. Enters through the reed valve

8. A system that uses a pump to force oil into engine parts

9. In winter service

10. Oil cools the engine while circulating and then returns to the oil reservior of the crankcase.

III-4-AS

1. a. Rope-rewind
   b. Electric (AC and DC)
   c. Vertical pull
   d. Rope rewind

2. Provide a means to turn the crankshaft and start the engine

3. Manual and electric

4. rope-wind, rope-rewind or recoil, windup

5. The rope is automatically rewound by a coil spring and is permanently attached.

6. The bendix type drive

7. DC

8. From negative to positive

9. voltage regulator

10. If the battery gets too hot, water in the electrolyte would boil away.

III-5-AS

1. a. 4
   b. 1
   c. 6
   d. 2
   e. 5
   f. 3

2. a. Rule
   b. Outside micrometer
   c. Depth micrometer
   d. Inside micrometer
   e. Vernier caliper
   f. Hole gauge
   g. Dial indicator
   h. Telescoping gauge

3. a. Scale
   b. Graduations
   c. Whole
   d. Reduce

4. a, b, d

5. a. Fixed jaw
   b. Movable jaw
   c. Vernier scale
   d. Adjusting nut
   e. Main scale
   f. Clamp
   g. Clamp screws
   h. Beam

6. a. Frame
   b. Anvil
   c. Spindle
   d. Lock
   e. Sleeve
   f. Thimble
   g. Ratchet stop

7. a. 0-in.-1.000-in.
      1) Spindle
      2) Zero
   b. More than one inch
      1) Minimum
      2) Sleeve, thimble

8. a. Bezel
   b. Clamp
   c. Housing
   d. Dial
   e. Plunger
   f. Pointer

9. a. 3
   b. 5
   c. 2
   d. 1
   e. 4

10. a. 0.750
    b. 0.201
    c. 0.655
    d. 0.075
    e. 0.527
    f. 0.009
    g. 0.662
    h. 0.048

11. a. 0.4678
    b. 0.8388
    c. 0.4715
    d. 0.9453
    e. 0.2928
    f. 0.3101
    g. 0.6383
    h. 0.3107
    i. 0.3128
    j. 0.5270

III-6-AS

1. A step by step procedure to locate an engine problem.
2. It saves the mechanic time repairing an engine and the customer money.
3. a, c, d
4. a, b, c, e, f

Using troubleshooting chart to solve these problems.

1. fuel problem; fuel tank vent plugged
2. loose or bent blade; bent crankshaft
3. the ignition switch was in kill position
4. out of time; armature air gap
5. fuel valve shut off
6. exhaust port clogged
7. loose flywheel; using wrong oil
8. cooling fins blocked; engine overloaded

ANSWERS TO ASSIGNMENT SHEETS
SECTION IV
WELDING

IV-1-AS

1. melting
2. 1900
3. fusion
4. higher
5. medical
6. acetylene
7. oxygen
8. explosive
9. efficiency
10. flame
11. a. true
    b. true
    c. false
    d. true
    e. false
    f. true
    g. false
    h. true
    i. true
    j. false
    k. false
    l. true
    m. true
    n. true
    o. false
    p. true
    q. false
    r. true
    s. false
    t. true
    u. true
    v. false
    w. true
    x. true
    y. true
    z false

12. a. 6
    b. 7
    c. 1
    d. 9
    e. 3
    f. 2
    g. 8
    h. 4
    i. 5

13. a. Acetylene burning in air
    b. Neutral
    c. Carburizing
    d. Oxidizing

14. a. 2
    b. 1

15 neutral

IV-2-AS

1. a. 10
   b. 5
   c. 4
   d. 1
   e. 7
   f. 6
   g. 2
   h. 3
   i. 9
   j. 8

2. a, c, e, f, g

3. a, c

4. b, c

5. a. Yes
   b. No
   c. No
   d. Yes
   e. Yes

6. a. Outside corner weld
   b. Flange weld

7. a. Overhead
   b. Horizontal
   c. Vertical
   d. Flat

8. a. A
   b. D
   c. A
   d. A
   e. A
   f. A

IV-3-AS

1. a. 3
   b. 11
   c. 9
   d. 5
   e. 7
   f. 1
   g. 10
   h. 2
   i. 4
   j. 6
   k. 8

2. a. 4
   b. 1
   c. 5
   d. 3
   e. 6
   f. 2

3. a. No
   b. Yes
   c. No
   d. Yes
   e. Yes
   f. Yes

4. b, c, d, f, g

5. a. for a short time
   b. pop
   c. goes out
   d. normally

6. a. inside the torch
   b. to go out
   c. beginning
   d. smoking, hot
   e. burn in half

7. a. 8
   b. 7
   c. 6
   d. 1
   e. 4
   f. 3
   g. 2
   h. 5

8. a. 3
   b. 1
   c. 2

9. a. square
   b. vertical, clean
   c. slag

10. a, b, d, e

IV-4-AS

1. a. 2
   b. 3
   c. 1
   d. 3
   e. 1

2. a, b, c

3. a. 6
   b. 10
   c. 8
   d. 7
   e. 4
   f. 12
   g. 11
   h. 3
   i. 13
   j. 1
   k. 2
   l. 9
   m. 5

4. a. AC welder
   b. DC welder
   c. AC-DC welder

5. a. 2
   b. 4
   c. 3
   d. 1

6. a, c, d, f

7. a. 6
   b. 2
   c. 1
   d. 7
   e. 11
   f. 8
   g. 9
   h. 12
   i. 3
   j. 10
   k. 5
   l. 2

8. a. Helmet
   b. Clear plastic lens
   c. Rubber gasket
   d. Filter lens
   e. Clear plastic lens
   f. Hold-down clamp

9. a. False
    b. False
    c. False
    d. True
    e. False
    f. True

10. a. True
    b. False
    c. True
    d. False
    e. True
    f. False

11. a. True
    b. False
    c. True
    d. True
    e. True
    f. True
    g. False

12. a. False
    b. True
    c. True
    d. False
    e. True
    f. False

13. a. False
    b. True
    c. False

14. a, b, d, f, g, i

15. a. E stands for electrode
    b. 60 represents 60,000 pounds of tensile strength of deposited metal
    c. 1 stands for all position electrode
    d. 1 represents the electrical characteristics of the electrode

16. a. 2
    b. 1

17. b, c, d, e, f, g

18. a, b, d, e, f

19. a. Vertical
    b. Overhead
    c. Horizontal
    d. Flat

20. a. Lap joint
    b. Tee joint
    c. Butt joint
    d. Edge joint

21. a. Face
    b. Throat
    c. Root

22. a. 1
    b. 8
    c. 9
    d. 2
    e. 6
    f. 3
    g. 4
    h. 5
    i. 10
    j. 11
    k. 7

IV-5-AS

1. a. 5
   b. 9
   c. 12
   d. 14
   e. 2
   f. 4
   g. 11
   h. 3
   i. 13
   j. 10
   k. 16
   l. 1
   m. 6
   n. 8
   o. 15
   p. 7

2. a, c, d, e, g, h, i

3. a. Yes
   b. No
   c. Yes
   d. Yes
   e. Yes
   f. Yes
   g. Yes
   h. No

4. a, b, c, e

5. a. Scratching
   b. Tapping

6. a, b, d, e

7. a. Makes weld stronger
   b. Improves penetration
   c. Improves appearance

8. a, c, d

IV-6-AS

1. a. 1
   b. 7
   c. 6
   d. 5
   e. 4
   f. 3
   g. 2

2. a, c, d, e,

3. a, b, c

4. a, c, d, e,

5. a, b

6. a, d, e

7. a, c, d

8. Flow, meter

9. Cubic

10. Solid, Flux-cored

APPENDIX B

ANSWERS TO COMPETENCY TESTS

ANSWERS TO COMPETENCY TESTS
SECTION II
MINOR AUTOMOTIVE MAINTENANCE

II-1-CT

1. 1. Safety: Minimizing harm and risk in the workplace to eliminate accidents.
    2. Personal safety: Protecting yourself from injury caused by your own or another worker's actions.
    3. Group safety: Protecting other workers from hazardous situations caused by neglect, abuse, or ignorance.

2. a, b, c

3. a. yourself
    b. unsafe
    c. protecting

4. Any four of these is acceptable:
    1. Horseplay
    2. Inadequate lighting
    3. Undesirable location of equipment
    4. Low ceilings
    5. Unguarded belts, gears, pulleys, blades, cutters, etc.
    6. Failure to allow for adequate safety zones around equipment
    7. Improper type and location of switches
    8. Poorly located, constructed, and maintained storage
    9. Waste materials, stock supplies, or liquids on the floor
    10. Improperly maintained tools and equipment
    11. Improper use of tools and equipment
    12. Failure to use protective equipment (Safety glasses are a must)
    13. Inadequate ventilated work areas
    14. Failure to adhere to personal grooming standards as related to the operation of equipment and/or the use of tools.
        Examples: Loose clothing: dangling jewelry; long, loose hair
    15. Use of alcohol or drugs by workers

5. a. False
   b. False
   c. False
   d. False

6. a. False
   b. True
   c. False
   d. True
   e. False
   f. False
   g. False
   h. True
   i. False

7. a. yes
   b. yes
   c. no
   d. no
   e. yes
   f. no
   g. yes
   h. yes
   i. no
   j. yes
   k. no
   l. yes

8. a. a jack stand
   b. in a secure position
   c. adequate lighting
   d. slowly

II-2-CT

1. The purpose of the combustion engine is to convert raw materials such as gasoline into mechanical power to do the many work-related jobs needed by man.

2. a. A device used to burn raw materials within itself
   b. A device used to accept the pressure of raw materials being burned in another source and then introduced into the engine

3. a. 3
b. 1
c. 2
d. 4
e. 7
f. 5
g. 6
h. 9
i. 10
j. 8
k. 6
l. 10
m. 11
n. 12
o. 13
p. 14
q. 10
r. 12
s. 11
t. 9
u. 8
v. 13
w. 14
x. 4
y. 11

4. a. Explosion over piston
b. 2
c. 5
d. 7
e. 4
f. 6
g. 1
h. 3

5. a. 1
b. 2
c. 3

6. a. yes
b. no
c. yes
d. yes
e. no

7. b, d, e

8. a. 2
b. 4
c. 3
d. 1

9. a. 2
b. 1
c. 4
d. 5
e. 3

10. a. 4
b. 3
c. 2
d. 1

II-3-CT

1. The purpose of the automotive fuel system is to store, transfer, and mix fuel and air for proper engine operation.

2. a. 2
   b. 3
   c. 1
   d. 4

3. a. fuel
   b. baffles
   c. expand
   d. filler opening
   e. amount

4. a. True
   b. False
   c. True

5. a. sends it to
   b. diaphragm
   c. camshaft

6. a. 1, 4, 5
   b. 2

7. a. air
   b. air, fuel
   c. 1, 3, 4

II-4-AS

1. 1. Cranking the engine

   2. Ignition

   3. Lighting and signaling

   4. Gauges and warning lights

2. a. 3
   b. 1
   c. 2

3. a. Direct current
b. Alternating current

4. a. 9
b. 7
c. 5
d. 3
e. 2
f. 8
g. 4
h. 6
i. 1
j. 13
k. 12
l. 10
m. 11
n. 14

5. a. Series
b. Parallel

6. a. Positive post
b. Electrolyte
c. Cells
d. Negative post

II-5-CT

1. The purpose of the ignition system is to supply and distribute high-voltage sparks that ignite the fuel-air mixture within the combustion chamber.

2. a. 6
b. 5
c. 3
d. 1
e. 2
f. 4

3. a. 4
b. 8
c. 11
d. 5
e. 13
f. 9
g. 12
h. 7
i. 2
j. 10
k. 1
l. 6
m. 3

4. a. 2
b. 5
c. 4
d. 7
e. 1
f. 6
g. 3

5. a. 5
   b. 4
   c. 6
   d. 2
   e. 3
   f. 1
   g. 7

6. a. 4
   b. 2
   c. 1
   d. 3

II-6-CT

1. The purpose of the lubrication system is to reduce friction throughout the automobile by means of oil, or grease, making the automobile a more economical, longer-lasting vehicle.

2. a, c, e, f, g

3. a. Canister type
   b. Spin-on

4. a. 4
   b. 1
   c. 6
   d. 13
   e. 7
   f. 12
   g. 9
   h. 8
   i. 5
   j. 11
   k. 2
   l. 10
   m. 3

5. b. Full-pressure oiling
   c. Splash oiling
   e. Combination full-pressure and splash oiling

6. a. yes
   b. yes
   c. no
   d. yes
   e. yes
   f. yes
   g. no

7. a. 3
   b. 1
   c. 2
   d. 4

II-7-CT

1. The purpose of the cooling system is to relieve heat generated by explosion in the engine by transferring the heat to the water in the water jackets running through the block, and then transporting it through the hoses to the radiator where it leaves the system by air being drawn through the radiator by the fan.

2. a. yes
   b. no
   c. yes
   d. no
   e. yes

3. a. 6
   b. 3
   c. 8
   d. 7
   e. 9
   f. 5
   g. 2
   h. 4
   i. 1

4. a. bellows
   b. pellet

5. a. permanent, replaceable
   b. lower
   c. ethylene glycol
   d. poisonous
   e. 24 months
   f. will

II-8-CT

1. The purpose of the exhaust system is to transfer the burned gases from the combustion chamber to the atmosphere and reduce the exhaust noise to an acceptable level.

2. a. 4
   b. 5
   c. 1
   d. 6
   e. 3
   f. 2

3. a. 4
   b. 3
   c. 1
   d. 5
   e. 2

4. a. 2
   b. 7
   c. 3
   d. 6
   e. 1
   f. 5
   g. 8
   h. 4

II-9-CT

1. a. 1
   b. 2
   c. 6
   d. 5
   e. 3
   f. 8
   g. 4
   h. 9
   i. 7

2. c, e, f, h, i

3. a. Dents
   b. Cracks
   c. Excessive wear in bolt holes
   d. Burrs
   e. Warpage

4. a. Excessive cornering speed
   b. Incorrect camber adjustment
   c. Incorrect toe-in or toe-out adjustment
   d. Under inflation
   e. Over inflation

5. Patch

6. To make the set of tires wear evenly and increase tread life

II-10-CT

1. The purpose of the brake system is to apply hydraulic pressure in the system, which produces friction between the brake shoe and drum and causes the automobile to slow or stop.

2. a. Brake lining
   b. Brake shoe
   c. Piston
   d. Cup
   e. Wheel cylinder

3. a. 9
   b. 1
   c. 12
   d. 10
   e. 11
   f. 3
   g. 5
   h. 6
   i. 4
   j. 2
   k. 8

4. a. Primary shoe
   b. Lever return spring
   c. Primary return spring
   d. Adjusting lever
   e. Anchor pin plate
   f. Wheel cylinder assembly
   g. Retainer
   h. Spring
   i. Secondary return spring
   j. Adjusting cable
   k. Secondary shoe
   l. Hold down pin
   m. Backing plate
   n. Hole covers

5. a. Retainer
   b. Reservoir cover
   c. Reservoir seal
   d. Master cylinder casting
   e. Rear piston assembly
   f. Vent seal
   g. Vent seal retainer
   h. Snap ring
   i. Secondary seals
   j. Floating piston
   k. Protector washer
   l. Primary seal
   m. Floating piston spring
   n. Floating piston stop bolt
   o. O-ring
   p. Check valves
   q. Tube seat inserts
   r. Check valve springs

6. a. 3
   b. 16
   c. 6
   d. 11
   e. 15
   f. 2, 7
   g. 12
   h. 4, 10
   i. 13
   j. 4
   k. 5
   l. 4, 10, 9
   m. 14

II-11-CT

1. a. 3
   b. 1
   c. 5
   d. 6
   e. 4
   f. 2
   g. 11
   h. 7
   i. 13
   j. 8
   k. 12
   l. 9
   m. 14
   n. 10
   o. 16
   p. 15
   q. 17

2. a. integral type
    b. conventional

3. a. Solid axle leaf spring suspension
    b. Independent coil spring suspension

4. a, d

5. a. Upper control arm
    b. Shock absorber
    c. Coil Spring
    d. Lower control arm
    e. Lower ball joint
    f. Steering knuckle
    g. Upper ball joint

6. a. Pitman arm
    b. Tie rod
    c. Idler arm support
    d. Idler arm
    e. Center link
    f. Adjustment sleeve

7. a. Coil spring
    b. Single leaf spring
    c. Multi-leaf spring
    d. Torsion bar spring

8. a. Telescopic
    b. Superlift
    c. Air adjustable
    d. Strut

II-12-CT

1. a. 2
    b. 6
    c. 5
    d. 1
    e. 3
    f. 4
    g. 7
    h. 8
    i. 11
    j. 10
    k. 9

2. a. Universal joint
    b. Propeller shaft
    c. Transmission
    d. Differential

3. a. Flywheel
    b. Pressure plate assembly
    c. Throw-out bearing
    d. Clutch fork
    e. Bell housing

4. a. 3
   b. second
   c. the same as
   d. 3.5 to 1

II-13-CT

1. F
2. T
3. F
4. T
5. T
6. F
7. F
8. T
9. F
10. F
11. T
12. F
13. T
14. T
15. T

ANSWERS TO COMPETENCY TESTS
SECTION III
SMALL ENGINE REPAIR

III-1-CT

1. The purpose of the combustion engine is to convert raw materials such as gasoline into mechanical power to do the many work-related jobs needed by man.

2. a. A device used to burn raw materials within itself
   b. A device used to accept the pressure of raw materials being burned in another source and then introduced into the engine

3. a. 3
   b. 1
   c. 2
   d. 4
   e. 7
   f. 5
   g. 6
   h. 9
   i. 10
   j. 8
   k. 6
   l. 15
   m. 11
   n. 12
   o. 13
   p. 18
   q. 10
   r. 12
   s. 11
   t. 9
   u. 8
   v. 13
   w. 18
   x. 4
   y. 11

4. a. Explosion over piston
   b. 2
   c. 5
   d. 7
   e. 4
   f. 6
   g. 1
   h. 3

5. a. 1
   b. 2
   c. 3

6. a. yes
   b. no
   c. yes
   d. yes
   e. no

7. b, d, e

8. a. 2
   b. 4
   c. 3
   d. 1

9. a. 1
   b. 2
   c. 3
   d. 4
   e. 5

10. a. 4
   b. 3
   c. 2
   d. 1

III-2-CT

1. The fuel system supplies a combustable mixture of air and fuel vapor to the engine cylinders.

2. a. Gravity feed
   b. Suction feed
   c. Pump feed

3. Float and diaphragm

4. The venturi is the section of the carburetor that is constricted, or has a smaller cross section area for air to flow through.

5. It controls the amount of gasoline that is available to the carburetor.

.6. a. 2
   b. 5
   c. 3
   d. 1
   e. 4

7. Carburetor

8. The diaphragm carburetor will work at any angle or position.

9. The purpose is to produce an extremely rich mixture of fuel for easy starting.

10. The throttle controls the engine speed by controlling the amount of fuel mixture entering the combustion chamber.

11. Air vane, mechanical governor

12.

Air vane	Mechanical
1. a	1. e
2. c	2. c
3. b	3. a
4. d	4. f
5. e	5. d
	6. b

III-3-CT

1. a. 4
   b. 1
   c. 3
   d. 2
   e. 7
   f. 5
   g. 6
   h. 8
   i. 9
   j. 10

2. b

3. a. Friction
   b. Cools or cushions
   c. Cylinders
   d. Clean

4. By using premix lubrication

5. Are printed on the side of the oil can

6. a. temperatures
   b. 0
   c. higher number
   d. viscosity

7. Enters through the reed valve

8. A system that uses a pump to force oil into engine parts

9. In winter service

10. Oil cools the engine while circulating and then returns to the oil reservior of the crankcase.

III-4-CT

1. a. Rope-rewind
   b. Electric (AC and DC)
   c. Vertical pull
   d. Rope rewind
2. Provide a means to turn the crankshaft and start the engine
3. Manual and electric
4. rope-wind, rope-rewind or recoil, windup
5. The rope is automatically rewound by a coil spring and is permanently attached.
6. The bendix type drive
7. DC
8. From negative to positive
9. voltage regulator
10. If the battery gets too hot, water in the electrolyte would boil away.

III-5-CT

1. a. 4
   b. 1
   c. 6
   d. 2
   e. 5
   f. 3
2. a. Rule
   b. Outside micrometer
   c. Depth micrometer
   d. Inside micrometer
   e. Vernier caliper
   f. Hole gauge
   g. Dial indicator
   h. Telescoping gauge
3. a. Scale
   b. Graduations
   c. Whole
   d. Reduce
4. a, b, d
5. a. Fixed jaw
   b. Movable jaw
   c. Vernier scale
   d. Adjusting nut
   e. Main scale
   f. Clamp
   g. Clamp screws
   h. Beam

6. a. Frame
   b. Anvil
   c. Spindle
   d. Lock
   e. Sleeve
   f. Thimble
   g. Ratchet stop

7. a. 0-in.-1.000-in.
      1) Spindle
      2) Zero
   b. More than one inch
      1) Minimum
      2) Sleeve, thimble

8. a. Bezel
   b. Clamp
   c. Housing
   d. Dial
   e. Plunger
   f. Pointer

9. a. 3
   b. 5
   c. 2
   d. 1
   e. 4

10. a. 0.750
    b. 0.201
    c. 0.655
    d. 0.075
    e. 0.527
    f. 0.009
    g. 0.662
    h. 0.048

11. a. 0.4678
    b. 0.8388
    c. 0.4715
    d. 0.9453
    e. 0.2928
    f. 0.3101
    g. 0.6383
    h. 0.3107
    i. 0.3128
    j. 0.5270

III-6-CT

1. A step by step procedure to locate an engine problem.
2. It saves the mechanic time repairing an engine and the customer money.
3. a, c, d
4. a, b, c, e, f

Using troubleshooting chart to solve these problems.

1. fuel problem; fuel tank vent plugged
2. loose or bent blade; bent crankshaft
3. the ignition switch was in kill position
4. out of time; armature air gap
5. fuel valve shut off
6. exhaust port clogged
7. loose flywheel; using wrong oil
8. cooling fins blocked; engine overloaded

ANSWERS TO COMPETENCY TEST

SECTION IV

WELDING

IV-1-CT

1. melting
2. 1900
3. fusion
4. higher
5. medical
6. acetylene
7. oxygen
8. explosive
9. efficiency
10. flame
11. a. true
    b. true
    c. false
    d. true
    e. false
    f. true
    g. false
    h. true
    i. true
    j. false
    k. false
    l. true
    m. true
    n. true
    o. false
    p. true
    q. false
    r. true
    s. false
    t. true
    u. true
    v. false
    w. true
    x. true
    y. true
    z false

12. a. 6
    b. 7
    c. 1
    d. 9
    e. 3
    f. 2
    g. 8
    h. 4
    i. 5

13. a. Acetylene burning in air
    b. Neutral
    c. Carburizing
    d. Oxidizing

14. a. 2
    b. 1

15. neutral

IV-2-CT

1. a. 10
   b. 5
   c. 4
   d. 1
   e. 7
   f. 6
   g. 2
   h. 3
   i. 9
   j. 8

2. a, c, e, f, g

3. a, c

4. b, c

5. a. Yes
   b. No
   c. No
   d. Yes
   e. Yes

6. a. Outside corner weld
   b. Flange weld

7. a. Overhead
   b. Horizontal
   c. Vertical
   d. Flat

8. a. A
   b. D
   c. A
   d. A
   e. A
   f. A

9. a. clean metal surface
   b. V-out weld area
   c. pre-heat metal slightly

10. a, c, d, e

IV-3-CT

1. a. 3
   b. 11
   c. 9
   d. 5
   e. 7
   f. 1
   g. 10
   h. 2
   i. 4
   j. 6
   k. 8

2. a. 4
   b. 1
   c. 5
   d. 3
   e. 6
   f. 2

3. a. No
   b. Yes
   c. No
   d. Yes
   e. Yes
   f. Yes

4. b, c, d, f, g

5. a. for a short time
   b. pop
   c. goes out
   d. normally

6. a. inside the torch
   b. to go out
   c. beginning
   d. smoking, hot
   e. burn in half

7. a. 8
   b. 7
   c. 6
   d. 1
   e. 4
   f. 3
   g. 2
   h. 5

8. a. 3
   b. 1
   c. 2

9. a. square
   b. vertical, clean
   c. slag

10. a, b, d, e

IV-4-CT

1. a. 2
   b. 3
   c. 1
   d. 3
   e. 1

2. a, b, c

3. a. 6
   b. 10
   c. 8
   d. 7
   e. 4
   f. 12
   g. 11
   h. 3
   i. 13
   j. 1
   k. 2
   l. 9
   m. 5

4. a. AC welder
   b. DC welder
   c. AC-DC welder

5. a. 2
   b. 4
   c. 3
   d. 1

6. a, c, d, f

7. a. 6
b. 2
c. 1
d. 7
e. 11
f. 8
g. 9
h. 12
i. 3
j. 10
k. 5
l. 2

8. a. Helmet
b. Clear plastic lens
c. Rubber gasket
d. Filter lens
e. Clear plastic lens
f. Hold-down clamp

9. a. False
b. False
c. False
d. True
e. False
f. True

10. a. True
b. False
c. True
d. False
e. True
f. False

11. a. True
b. False
c. True
d. True
e. True
f. True
g. False

12. a. False
b. True
c. True
d. False
e. True
f. False

13. a. False
b. True
c. False

14. a, b, d, f, g, i

15. a. E stands for electrode
b. 60 represents 60,000 pounds of tensile strength of deposited metal
c. 1 stands for all position electrode
d. 1 represents the electrical characteristics of the electrode

16. a. 2
    b. 1

17. b, c, d, e, f, g

18. a, b, d, e, f

19. a. Vertical
    b. Overhead
    c. Horizontal
    d. Flat

20. a. Lap joint
    b. Tee joint
    c. Butt joint
    d. Edge joint

21. a. Face
    b. Throat
    c. Root

22. a. 1
    b. 8
    c. 9
    d. 2
    e. 6
    f. 3
    g. 4
    h. 5
    i. 10
    j. 11
    k. 7

IV-5-CT

1. a. 5
   b. 9
   c. 12
   d. 14
   e. 2
   f. 4
   g. 11
   h. 3
   i. 13
   j. 10
   k. 16
   l. 1
   m. 6
   n. 8
   o. 15
   p. 7

2. a, c, d, e, g, h, i

3. a. Yes
   b. No
   c. Yes
   d. Yes
   e. Yes
   f. Yes
   g. Yes
   h. No

4. a, b, c, e

5. a. Scratching
   b. Tapping

6. a, b, d, e

7. a. Makes weld stronger
   b. Improves penetration
   c. Improves appearance

8. a, c, d

IV-6-CT

1. a. 1
   b. 7
   c. 6
   d. 5
   e. 4
   f. 3
   g. 2

2. a, c, d, e,

3. a, b, c

4. a, c, d, e,

5. a, b

6. a, d, e

7. a, c, d

8. Flow, meter

9. Cubic

617

10. Solid, Flux-cored

COMPLIANCE STATEMENT

TITLE VI, CIVIL RIGHTS ACT OF 1964; THE MODIFIED COURT ORDER, CIVIL ACTION 5281, FEDERAL DISTRICT COURT, EASTERN DISTRICT OF TEXAS, TYLER DIVISION

Reviews of local education agencies pertaining to compliance with Title VI Civil Rights Act of 1964 and with specific requirements of the Modified Court Order, Civil Action No. 5281, Federal District Court, Eastern District of Texas, Tyler Division are conducted periodically by staff representatives of the Texas Education Agency. These reviews cover at least the following policies and practices:

(1) acceptance policies on student transfers from other school districts;

(2) operation of school bus routes or runs on a non-segregated basis;

(3) nondiscrimination in extracurricular activities and the use of school facilities;

(4) nondiscriminatory practices in the hiring, assigning, promoting, paying, demoting, reassigning, or dismissing of faculty and staff members who work with children;

(5) enrollment and assignment of students without discrimination on the basis of race, color, or national origin;

(6) nondiscriminatory practices relating to the use of a student's first language; and

(7) evidence of published procedures for hearing complaints and grievances.

In addition to conducting reviews, the Texas Education Agency staff representatives check complaints of discrimination made by a citizen or citizens residing in a school district where it is alleged discriminatory practices have occurred or are occurring.

Where a violation of Title VI of the Civil Rights Act is found, the findings are reported to the Officer for Civil Rights, Department of Health, Education and Welfare.

If there is a direct violation of the Court Order in Civil Action No. 5281 that cannot be cleared through negotiations, the sanctions required by the Court Order are applied.

TITLE VII, CIVIL RIGHTS ACT OF 1964; EXECUTIVE ORDERS 11246 AND 11375; TITLE IX, 1973 EDUCATION AMENDMENTS; REHABILITATION ACT OF 1973 AS AMENDED; 1974 AMENDMENTS TO THE WAGE-HOUR LAW EXPANDING THE AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967; AND VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1972 AS AMENDED IN 1974.

It is the policy of the Texas Education Agency to comply fully with the nondiscrimination provisions of all federal and state laws and regulations by assuring that no person shall be excluded from consideration for recruitment, selection, appointment, training, promotion, retention, or any other personnel action, or be denied any benefits or participation in any programs or activities which it operates on the grounds of race, religion, color, national origin, sex, handicap, age, or veteran status (except where age, sex, or handicap constitute a bona fide occupational qualification necessary to proper and efficient administration). The Texas Education Agency makes positive efforts to employ and advance in employment all protected groups.

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